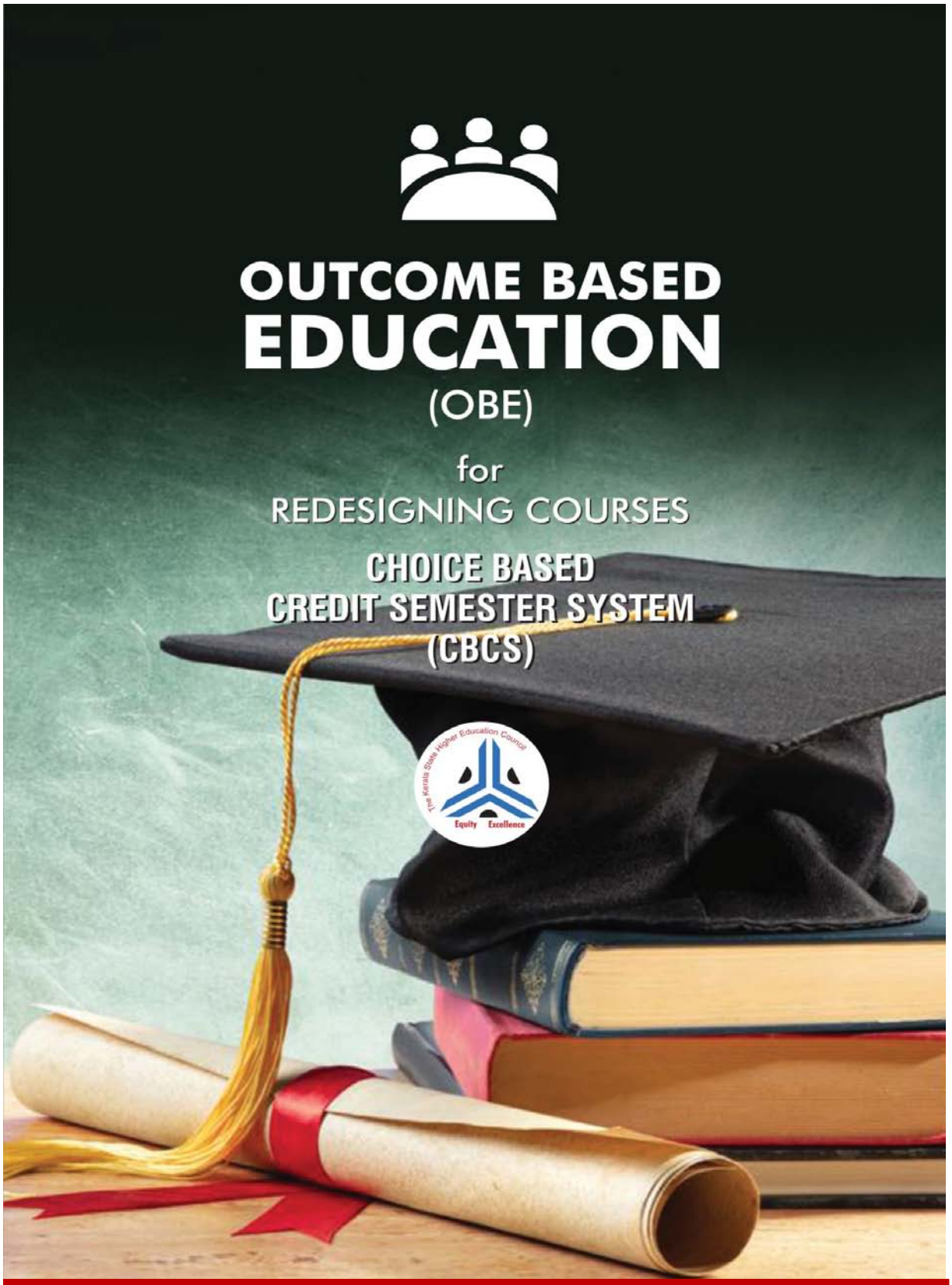


THE KERALA STATE HIGHER EDUCATION COUNCIL

Thiruvananthapuram

OUTCOME BASED EDUCATION

[OBE]

for

REDESIGNING COURSES

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

(CBCS)

THE KERALA STATE HIGHER EDUCATION COUNCIL

Thiruvananthapuram

November 2020

The Kerala State Higher Education Council

Science and Technology Museum Campus

Vikas Bhavan P.O.,

Thiruvananthapuram-695033,

Kerala, India Phone: 0471 2301292

Fax: 0471 2301290

Email: heckerala@gmail.com

Published in connection with the Training Programme on

Redesigning of Courses for Outcome Based Education

In State Universities in Kerala

Pages: 134

Published by The **Kerala State Higher Education Council**

Thiruvananthapuram

Towards Outcome-based Education[1]

Prof. (Dr) Rajan Gurukkal

Science and technology have caused the appearance of a variety of pedagogic strategies that have acquired presence in almost all educational systems. Although this has opened up enormous possibilities for students and teachers to make use of, some important questions continue to haunt educational systems everywhere. Hardly any breakthrough has been achieved with regard to teaching or how to learn. Slightly altered versions of earlier rote-learning, which compel students to reproduce whatever is conveyed to them by their teachers, remain still valid. Students have to learn what the system or teachers as representatives of the system, chooses to teach them and at the end of such educational transactions they have to face a test set by the very same system. There is no scope for students to frame their questions or exercise freedom to ask questions in their own way. Portions of the syllabus for any academic programme require rethinking against the background of changes occurring in society as well as at the level of knowledge attained in the domain concerned. Often many things already learnt recur at higher stages not only adding to the tedium of familiarity but also rendering the obsolete plausible again, rather than letting students unlearn them. Same lessons indiscriminately passed on to higher levels impede the process of learning by turning it into mere memorizing. Understanding ceases with the precedence of remembrance over it. Such aberrations should never happen in a very serious and sensitive area of human endeavour like education. That such a situation prevails, in spite of technological advances providing for effective ways of teaching how to learn systematically by unlearning, is an issue quite frustrating. This is one of the most important problems that the world higher education encounters in the wake of the techno-economic globalization that shakes the core of the production of knowledge. It is a fact that the exponential rate of the so-called knowledge production has shot up amazingly high, but a major part of such knowledge is mere information. As a result, transmission of knowledge has become all the more mechanical and alienating. Naturally, the quality of teaching and learning has become abysmally poor. Naming this kind of inappropriate production and transaction of knowledge as education is being questioned very seriously. Teaching how to learn and deepening learning through

[1]Article originally published in *Higher Education for the Future* 5(1) 1–3 ©2018 The Kerala State Higher Education Council SAGE Publications sagepub.in/home.nav
DOI: 10.1177/2347631117740456 http://hef.sagepub.com

systematic unlearning have to be resuscitated as inevitable constituents of quality assurance. In the context, Outcome-based Education (OBE) has been gaining obsessive emphasis as a means to achieve quality. OBE is based upon an educational theory which integrates every aspect of educational system with a set of avowed outcomes. Outcomes are presented as items which should inevitably be attained by every student at the end of his or her educational experience. OBE insists upon determination of learning outcomes as the first step in course designing. Outcomes which are decided upon should evolve out of the contents, instructional strategies, learning experiences, methods of evaluation and the assessment. At different levels of higher education, each course should have its own expected outcomes, explained logically through a linked process which can be defended as to its ability to produce graduates with predetermined outcomes. The worthiness or desirability of the whole course can be prejudged before its implementation, by the defensibility of its objectives, namely the outcomes, and how they can be achieved through the several steps contained in the process. Precisely drawn specific outcomes provide clarity of purpose in teaching/learning. They act as a running thread of quality control across the planning of curriculum, selection of instructional strategies, choice of learning experience and preparation of tests. Informing learners about the outcome well in advance, OBE enables ongoing concurrent self-assessment of learners for making sure of their progress towards attaining the outcome. It provides them with chances to demand new learning experiences that ensure outcome. Since the outcomes are stated, the teachers also get to know the progress, and they enjoy the legitimate right to test whether the learners have attained the goal. In such a system, teachers become lucid about teaching how to learn and students, clear about learning how to create. If in the earlier system, teaching was defined as a task to be carried out within the syllabus–curriculum set framework; under OBE, it becomes a definite responsibility to be carried out in such a way as to meet the objectives or outcomes. Similarly, students under the new system get opportunity as well as reasons to chart out their own innovative ways of learning. Transcending the stereotypical, OBE provides opportunities to learn differently, naturally and creatively. It is mastery learning but with criticality and creativity. Once OBE is accepted, the differences between types of institutions do not matter so much, as between distance learning or campus-based learning. What matters is whether the graduate has attained the objectives set for the course. It is true that within the prevalent pedagogic or andragogic process, there are several gaps, both in terms of curriculum objectives and in terms of syllabus based transaction, which make the final test itself superfluous. On the contrary, OBE provides a tightly spelt-out process,

the internal parts of which are logically linked to one another. Obviously, OBE is a very transparent system right from curriculum planning to the declaration of the assessment result. However, we cannot uncritically accept OBE and hail it as a panacea. There are several factors that hold us sceptical about it. For instance, who or what combination of forces will be instrumental in setting the objectives or outcomes is a crucial question. In a techno economically globalized world the general objectives may be set globally on the basis of the requirements of reproducing such a universal system. OBE may also be biased in producing and reproducing the techno-economic system that is already predominant. Insistence upon determining the outcomes beforehand is logically the same that we see in any of the projects in the economy, which rigorously spell out their deliverables in advance. Just as the earlier system/systems demanded uncritically recreating the main features that were already predominant, OBE may also in a more efficient manner be doing the same. Therefore, it is extremely important to be cautious about such lurking dangers of the system and evolve strategies to counter them. A crucial step is to ensure that specific internal features of OBE are set forth as foolproof. The internal logic which leads the system towards outcomes and the way in which creative and innovative methods are encouraged to be adopted, will reduce the possibilities of deadpan repetition as could be doubted. Nevertheless, a reason for favouring OBE is that hardly can we escape the global strategies of standardization, classification and ranking. Whether we wish it or not, international accreditation agreement for professional courses is mandatory. Powerful motives of economies of scale and advantages for use for further processing are behind it. In such a situation, professional courses will be expected to be part of a standardized world-wide system. Courses and Credits in the General Stream too have to be precisely defined in alignment with international standards. Strengthening teaching/learning system in higher education institutions today means a package of curriculum design, course design, instruction design, and test design following global standards. Re-articulation of higher education in tune with OBE is no more a matter of choice today. Such discussions are to be encouraged in educational planning.

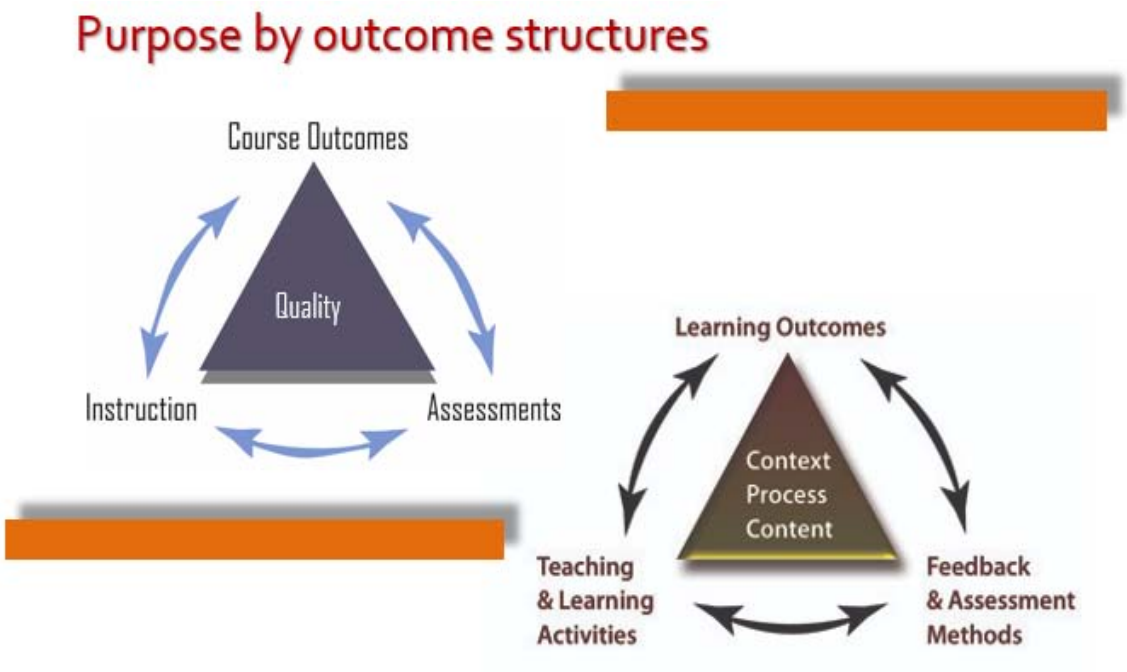
Prof. (Dr) Rajan Gurukkal is Chief Editor of *Higher Education for the Future* and Vice Chairman of Kerala State Higher Education Council

CHAPTER-1

1. Overview

Outcome Based Education is an approach to education in which decisions about the curriculum and instruction are driven by the exit learning outcomes that the student should be displayed at the end of the programme or a course. The fundamental objective is to establish the conditions and opportunities within the system that enable and encourage all students to achieve those essential outcomes. Courses are well designed instruction packages in specific knowledge fields, with preconceived results that go into the making of the outcome of the Academic Programme. They are scientifically structured with insights of continuity, sequence, and integration, appropriate for effective learning. The educational purposes a general program in India seeks to attain are Program Outcomes (Graduate Attributes or GAs) as identified by the University/Autonomous Institution and Program Specific Outcomes chosen by the Department offering the program. Program Outcomes (POs or GAs) are what the students of any undergraduate general program are required to attain at the time of graduation. These relate to the knowledge, skills and behaviour the students acquire through the program. UGC has made it mandatory for all universities to follow the system of Choice Based Course (CBC) and Outcome Based Education (OBE). Designing a Course is part of the science of teaching and learning. Precisely drawn outcomes of a Course provide clarity of purpose in teaching/learning. They act as a running thread of quality control across the planning of curriculum, selection of instructional strategies, choice of learning experience, and preparation of tests. Informing learners about the outcome well in advance, OBE enables ongoing concurrent self-assessment of learners for making sure of their progress towards attaining the outcome.

Training on Outcome Based Education is provided by the Kerala State Higher Education Council to all higher education institutions, especially those having their own board of studies in preparing the curriculum in the disciplines concerned. The institutions offering undergraduate and post graduate programmes belong to those university centres and those affiliated to the universities. Board of Studies in all disciplines are un existence which review and design the curriculum on time to time basis as prescribed by the university.



KSHEC has conducted 18 such workshops exclusively to address Outcome Based Education and Curriculum redesigning at university level and autonomous institution level. The original contents of the workshop have been developed by Prof. N.J. Rao who led the workshop at University level for the Board of Studies members of various disciplines. It was held at 7 universities of the state involving at least 30 participants to work as individual subject group performing 6 sample exercises as follows:

Exercise 1: Identifying the appropriate Programme Outcomes (PO)

Exercise 2: Generating Questions/statements of 6 levels of Cognitive Domains of Revised Bloom's Taxonomy

Exercise 3: Writing down up to 4 Programme Specific Outcomes (PSO) for specific programmes

Exercise 4: Developing up to 8 statements of Course Outcomes (CO)

Exercise 5: Tagging of COs to POs and PSOs, that are already developed

Exercise 6: Attainment calculation of COs, PSOs and Pos

2. Workshop Schedule - Outcome Based Education

KSHEC organises workshops with the collaboration of state universities and various institutions of autonomous nature functioning in the state. It also provides resource persons for the conduct

of such workshops which are activity oriented. Participating faculty members are advised to bring the laptops/computer so as to enable the workshop fully hands-on-experience on writing the outcomes and computation of attainment. The two-day duration workshop is generally scheduled to contain the following aspects as per the time slots fixed.

1st Day

Session 1: Science and Philosophy of OBE
Session 2: Accreditation and CBCS, Credit Pattern
Session 3: Exercise 1, Identify the Program Outcomes (PO) and Writing PSOs
Session 4: Taxonomy of Learning
Session 5: Exercise 2, Cognitive Level Assessment Items
Session 6: Concept of Course Outcomes
Session 7: Exercise 3, Writing Course Outcomes

2nd Day

Session 1: Fine Tuning of Course Outcomes (Exercise 3 based)
Session 2: Tagging of Course Outcomes
Session 3: Exercise 4, Tagging of Course Outcomes
Session 4: Mapping strength, Attainment of COs, PSOs and POs
Session 5: Question Setting with OBE-tips
Session 6: Mapping strength, Attainment of COs, PSOs and POs
Session 7: Closing the loop. Feedback and Discussions.

3. Workshops Held

The state higher education council has organized workshops at various institutions addressing different disciplines during the period from 2017-18 to 2019-20. The following table list the workshops held.

2017-18 to 2019-20.

Sl.No	Programme	Beneficiary Group	Period
1	Redesigning of Courses for Outcome Based Education **Resource Person:** Prof. N.J.Rao and Dr. K.Rajanikanth, of IISc, Bangalore	Chairman+One member from BoS of Science and Applied Science Faculties in University of Kerala **Venue:** KSHEC, Board Room, Tvpm No. of Participants: 32	16-12-17 To 18-12-2017
2	Redesigning of Courses for Outcome Based Education **Resource Person:** Prof. N.J.Rao and Dr. K.Rajanikanth, of IISc, Bangalore	Chairman+One member from BoS of Science Faculties in Mahatma Gandhi University **Venue:** M.G.University, Kottayam No. of Participants: 32	17-1-2018 To 19-1-2018
3	Redesigning of Courses for Outcome Based Education **Resource Person:** Prof. N.J.Rao and Dr. K.Rajanikanth, of IISc, Bangalore	Curriculum Committee Members and BoS members of KTU and CUSAT respectively **Venue:** CUSAT Main Campus, Kalamassery No. of Participants: 36	14-2-2018 To 16-2-2018
4	Redesigning of Courses for Outcome Based Education Resource Person: Prof. N.J.Rao and Dr. K.Rajanikanth, of IISc, Bangalore	PG - BoS members of SSUS, Kalady Venue: SSUS, Kalady Campus No. of Participants: 36	12-11-2018 To 14-11-2018
5	Redesigning of Courses for Outcome Based Education Resource Person: Prof. N.J.Rao and Dr. K.Rajanikanth, of IISc, Bangalore	UG - BoS members of Kannur University Venue: Thavakkara Campus, Kannur No. of Participants: 48	29-1-2019 To 31-1-2019

6	Redesigning of Courses for Outcome Based Education Resource Person: Prof. N.J.Rao and Dr. K.Rajanikanth, of IISc, Bangalore	UG - BoS members of Calicut University Venue: Thenhipalam Campus, Calicut No. of Participants: 47	12-2-2019 To 14-2-2019
7	Outcome Based Teaching and Evaluation (OBTE) Resource Person: Dr. Manulal P. Ram, KSHEC and Sri. Vijayakrishnan, Govt. College, Chittur	UG-BoS members of Maharajas (Autonomous) College, Ernakulam Venue: Maharajas College, Ernakulam No. of Participants: 40	11-3-2019 To 12-3-2019
8	Outcome Based Teaching and Evaluation Resource Person: Prof. Rajan Gurukkal, KSHEC, Dr. Manulal P. Ram, KSHEC Dr. Ajay K., Govt. College, Kottayam	UG-BoS members of Sacred Heart (Autonomous) College, Thevara, Ernakulam Venue: SH College, Thevara No. of Participants: 54	02-5-2019 To 03-5-2019
9	Outcome Based Education Resource Person: Dr. Manulal P. Ram, KSHEC Dr. Ajay K., Govt. College, Kottayam Mr. Vijayakrishnan M., Govt. College, Chittur	UG-BoS members of fatima Mata National (Autonomous) College, Kollam Venue: FMN College, Kollam No. of Participants: 52	14-5-2019 To 15-5-2019
10	Outcome Based Education Resource Person: Prof. Rajan Gurukkal, KSHEC, Dr. Manulal P. Ram, KSHEC Dr. Saju T.S. SSUS	UG-BoS members of Christ College (Autonomous) Irinjalakuda Venue: Christ College Irinjalakuda No. of Participants: 54	22-5-2019 To 23-5-2019
11	Outcome Based Education Resource Person: Dr. Manulal P. Ram, KSHEC	UG-BoS members of St.Teresa's College, Ernakulam Venue: St.Teresa's College	24-6-2019 To 25-6-2019

	Dr.Shafeeque, KSHEC Dr.Ajay K., Govt. Kottayam Dr. Saji Mathew KSHEC	No. of Participants: 52	
12	Outcome Based Education Resource Person: Dr. Manulal P. Ram, KSHEC Dr.Shafeeque, KSHEC Dr. Saji Mathew KSHEC	UG-BoS members of St.Josephs College (Autonomous) Irinjalakuda Venue: College, Irinjalakuda No. of Participants: 60	15-7-2019 To 16-7-2019
13	Outcome Based Education Resource Person: Dr. Manulal P. Ram, KSHEC Dr. Shafeeque, KSHEC Dr. Saji Mathew KSHEC	UG-BoS members of St.Thomas College (Autonomous) Thrissur Venue: St. Thomas College, TSR No. of Participants: 56	26-8-2019 To 27-8-2019
14	Outcome Based Education Resource Person: Dr. Manulal P. Ram, KSHEC Dr.Shafeeque, KSHEC	Faculty Members of St. Xavier's Women's College Aluva Venue: College No. of Participants: 48	5-10-2019
15	Outcome Based Education Resource Person: Dr. Manulal P. Ram, KSHEC Dr.Shafeeque, KSHEC	UG-BoS Members of MES Mampad (Autonomous) College, Mampad Venue: MES College No. of Participants: 38	9-10-2019 to 10-10-2019
16	Outcome Based Education Resource Person: Dr. Manulal P. Ram, KSHEC Dr.Shafeeque, KSHEC	Faculty Members of Layola College of Social Sciences, Trivandrum Venue: Layola College No. of Participants: 20	14-10-2019
17	OBE-Hands-On-Training Resource Persons: Prof. Rajan Gurukkal Dr. Manulal P. Ram, KSHEC	Faculty Members of different Colleges Venue: St. Xavier's College for Women No. of Participants: 60	28-10-2019 to 29-10-2019

	Dr.Saji Mathew, KSHEC Dr. Ajay K.K., Govt. College, Kottayam		
18	Outcome Based Education and Choice Based Credit Semester System Resource Persons: Dr. Jogy Alex, St. Thomas College Pala Dr. Manulal P. Ram, KSHEC	Faculty Members of K.R.Narayanan National Institute of Visual Arts and Studies (KRNIVAS), Thekkumthala, Kottayam Number of Participants: 20	19-12-2019 to 20-12-2019
19	Outcome Based Education Resource Persons: Dr. Manulal P. Ram, KSHEC Dr. Saji Mathew, MG University Dr. Shafeeque V., KSHEC	Faculty Members of Mar Ivanios (Autonomous) College, Nalanchira Venue: College Auditorium Number of Participants: 60	24-1-2020 to 25-1-2020
20	Revisiting POS, PSOs, and COs: A workshop Resource Persons: Dr. Manulal P. Ram, KSHEC Dr. Shafeeque V., KSHEC	Science Faculty Members of St. Thomas (Autonomous) College, Thrissur Venue: College Conference Hall Number of Participants: 20	10-02-2020

4. **Outcomes of the Workshop**

The workshop primarily involves the following sessions and at the end of the workshop, the participants are equipped to identify the appropriate graduate attributes/programme outcomes applicable to university level/autonomous college. They will also be familiar to write down the Programme Specific Outcomes of the subject they belong in 3-4 PSOs. In a course level/instructional level, they will also be prepared to write course outcomes of 6-8 in number for any specific courses they have proficiency in teaching. Subsequently, the mapping of the COs, PSOs and POs are done and also to identify the attainment level computation of these outcomes. Therefore, the workshop outcomes can be briefly divided to the following parts.

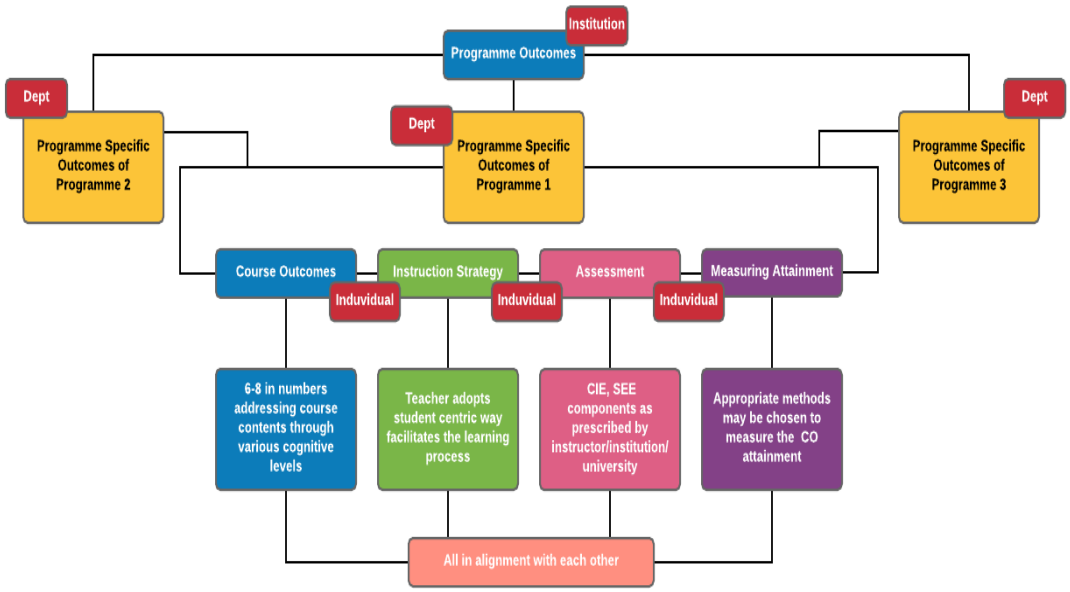
- Understand the relevance of OBE in the context of accreditation and higher education of India
- Understand what OBE is and choose Program Outcomes/Graduate Attributes
- Understand the Anderson-Bloom Taxonomy of learning
- Familiar with Program Specific Outcomes (PSOs) for all specific programmes on Undergraduate level for a general higher education program
- Write Course Outcomes (COs) for a general course to meet the selected subset of Program
- Preparing Assessment Questions based on taxonomy of classification
- Compute the attainment of COs, PSOs and POs in general for further evaluation and improvement

Universities and autonomous institutions trained in OBE have already started to implement the scheme by involving all BoS members in redesigning their existing curriculum in the first phase.. Intensive workshops followed by the one which the council has provided were held subsequently to most of these institutions. SSUS Kalady, Kannur University, and many autonomous institutions have progressed much in implementing this in order to gain the benefits of higher order cognitive skills in their teaching learning activities as well as for the preparatory engagements for NAAC accreditation process. In addition to the autonomous institutions and universities, many affiliated institutions have also expressed their willingness to avail the service of the council in providing OBE training so that, this will facilitate the preparation for accreditation and for incorporating taxonomy of learning in class room instructions and internal assessment components.

5. Action Plan

In order to make it in to practice the outcomes of the workshop, KSHEC and the resource persons are available for any technical or resource support in curriculum redesigning. Universities are in the process of curriculum revision with the idea conceived by the BoS members in support of designing the curriculum/syllabi. The council is observing the progress in this matter at university/autonomous institution level.

The institutions once trained in OBE expects further assistance of resource persons as and when they prepare or modify their curriculum using the scheme of OBE.



OBE and Assessment & Accreditation Process

As per the Mandatory assessment and Accreditation of higher educational Institutions Regulation, 2012 all specified Higher Educational Institutions have to undergo mandatory accreditation by the Accreditation agency after passing out of two batches or six years, whichever is earlier. One of the major objectives for this is to "facilitate students achieve learning outcomes appropriate to their course and relevant to their context, as shall be declared by the Higher Educational Institutions". While the objective of mandatory accreditation is laudable, the task of setting up the Learning Outcomes was left to the HEIs, thereby negating a common minimum framework for the country, as a whole. India, represented by the National Board of Accreditation (NBA), was accepted as a provisional member of the Washington Accord in the year 2007 and continues to be so, till date. India could become a full signatory only after implementation of Outcomes Based Education in Engineering Institutions. NBA has included the WA criteria as part of its accreditation process in November 2012 and similarly, in general programmes National Assessment and Accreditation Council (NAAC) has also adopted this quality criteria based on Outcome based Education in its assessment and accreditation process. A significant weightage has been allocated for OBE envisaged programmes in UG and PG levels of professional and general education

programmes of the country by both assessment instruments (NBA and NAAC) in higher education sector of the country. A set of suitable POs are provided in the manual of NBA and NAAC, that the institutions can either select a few or they are having the freedom to evolve appropriate POs of their choice meeting the specific objectives of their institutional quality. Similarly, templates of PSOs and COs are also provided for quick reference.

This handbook is providing a set of POS, PSOs and COs as those developed by various institutions as a part of the workshops provided by the Kerala State Higher Education Council.

Instructional Template

for

Facilitating

Implementation of

Choice Based Credit System (CBCS)

CHAPTER-2

MINIMUM COURSE CURRICULUM FOR UNDERGRADUATE COURSES UNDER CHOICE BASED CREDIT SYSTEM

2.1. Background/Preamble:

Education plays enormously significant role in building of a nation. There are quite a large number of educational institutions, engaged in imparting education in our country. Majority of them have entered recently into semester system to match with international educational pattern. However, our present education system is churning out youth who have to compete locally, regionally, nationally as well as globally. The present alarming situation necessitates transformation and/or redesigning of system, not only by introducing innovations but developing "learner-centric approach.

Majority of Indian higher education institutions have been following the system which obstructs the flexibility for the students to study the subjects/courses of their choice and their mobility to different institutions. There is need to allow the flexibility in education system, so that students depending upon their interests can choose inter-disciplinary, intra-disciplinary and skill-based courses. This can only be possible when choice based credit system (CBCS),an internationally acknowledged system, is adopted. The choice based credit system not only offers opportunities and avenues to learn core subjects but also explore additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS will undoubtedly facilitate benchmarking of our courses with best international academic practices.

2.2. Advantages of the Choice Based Credit System:

- Shift in focus from the teacher-centric to student-centric education.
- Student may undertake as many credits as they can cope with (without repeating all courses in a given semester if they fail in one/more courses).
- CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, skill oriented

papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility for students.

- CBCS makes education broad-based and at par with global standards. One can take credits by combining unique combinations. For example, Physics with Economics, Microbiology with Chemistry or Environment Science etc.
- CBCS offers flexibility for students to study at different times and at different institutions to complete one course (ease mobility of students). Credits earned at one institution can be transferred to another institution.

2.3. CHOICE BASED CREDIT SYSTEM (CBCS):

These courses aim to provide a paradigm shift in the national education policy seeking to bridge an increasing gap between an undergraduate degree and employability. The proposed curriculum endeavours to empower the students and help them in their pursuit for achieving overall excellence. Being the regulatory authority for higher education in India, the UGC constantly engages itself to suggest and facilitate the implementation of schemes and programs, which improves not only the level of academic excellence but also improves the academic and research environment in this country.

The main feature of the CBCS is to make undergraduate education student centric rather than system centric or teacher centric. For achieving these objectives, the CBCS strives to create a holistic syllabus. Thus, in addition to dedicated focus on a discipline through core papers whether in an honours curriculum or a regular curriculum, elective papers have been added which will give students the freedom to choose the allied/applied/broad areas of their discipline and also the areas of other disciplines of their interest. Further in keeping with the vision of the Government, special emphasis has been given to ability enhancement and skill development of students through elective courses under these domains which every student is required to study. However, in keeping with the spirit of CBCS here also the students will have complete freedom to choose these courses from a pool suggested by the UGC/Universities.

All papers except core papers offer complete freedom to the Universities in designing and reviewing the syllabi and enable them to offer their own distinct flavour and maintain their unique character. These elective papers provide them with the opportunity to develop competencies of students in their areas of strength, expertise and specialization. Even in the core

papers under the proposed guidelines 30% flexibility is proposed in adopting the syllabus as per the template advised by the UGC. It is pertinent to point out that as per the existing education policy different institutions and universities are required to maintain 70% equivalence in the syllabi and the same is being maintained under the proposed system of CBCS.

There is apprehension amongst the faculty from different institutions that with the implementation of CBCS there will be migration or transfer of the faculty from one institution to another which is far from truth.

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective and skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marking system. Therefore, it is necessary to introduce uniform grading system. This will benefit the students to move across institutions both within India and across countries. In order to bring the uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines which are also annexed herewith.

Tentative list of Undergraduate Disciplines/Courses to be covered under CBCS developing common minimum structure and syllabi:

2.4. BACHELOR COURSES UNDER CBCS IN INDIAN UNIVERSITIES AND COLLEGES

1. B. Sc. (Honours)Physics
2. B. Sc. Physical Sciences (Physics, Chemistry, Mathematics)
3. B. Sc. Physical Sciences (Physics, Mathematics, Electronics)
4. B. Sc. Physical Sciences (Physics, Mathematics, Computer Science)
5. B. Sc. With Physics
6. B. Sc. With Electronics
7. B. Sc. (Honours) Electronic Science
8. B. Sc. (Honours) Instrumentation
9. B. Sc. (Honours) Chemistry
10. B. Sc. With Chemistry
11. B. Sc. (Honours) Zoology
12. B. Sc. With Zoology

13. B. Sc. (Honours) Botany
14. B. Sc. With Botany
15. B. Sc. Life Sciences (Botany, Zoology, Chemistry)
16. B. Sc. (Honours) Biomedical Sciences
17. B. Sc. (Honours) Biotechnology
18. B. Sc. (Honours) Microbiology
19. B. Sc. (Honours) Biochemistry
20. B. Sc. (Honours) Forensic Science
21. B. Sc. (Honours) Environmental Science
22. B. Sc. (Honours) Biological Sciences
23. B. Sc. (Honours)Anthropology
24. B. Sc. (Honours) Computer Science

27. B. A. with Computer Applications2
28. B. Sc. (Honours) Operational Research
29. B. A. with Mathematics
30. B. Sc. Mathematical Science
31. B. Sc. (Honours) Applied Mathematics
32. B. Sc. (Honours)Mathematics
33. B. Sc. With Mathematics
34. B. Sc. with Mathematics and Computer Application
35. B. Com.(Honours)
36. B. Com
37. B.A. with Economics
38. B.A. (Honours) Economics
39. B.A. (Honours) Business Economics
40. B.A. (Honours) Psychology
41. B.A. with Psychology
42. B.A. (Honours) Applied Psychology
43. B.A with History
44. B.A. (Honours) History
45. B.A. (Honours) Geography
46. B.A. (Honours) Political Science

47. B.A. with Political Science

48. B. B. A./B. M.S

49. B. A. (Honours) Hindi

50. B. A. with Hindi

51. B. A. (Honours) Sanskrit

52. B. A. with Sanskrit

53. B. A. (Honours) Urdu

54. B. A. with Urdu

55. B. A. with Tamil

56. B. A. with Telugu

57. B. A. (Honours) Punjabi

58. B. A. with Punjabi

59. Bachelor of Hotel Management

60. B. A. (Honours)English

61. B. A. with English

62. B. A. with Comparative Literature

63. B. A. (Honours) Comparative literature

64. B. A. (Honours) Italian

65. B. A. Honours Spanish

66. B. A. (Honours) French

67. B. A. (Honours) German

68. B. Sc. (Honours) Home Science

69. B. Sc. with Home Science

70. B. A. with Persian

71. B. A. (Honours) Persian

72. B. A. (Honours) Tamil

73. B. A. (Honours) Bengali

74. B. A. with Bengali

75. B. A. (Honours) Gujarati

76. B. A. with Gujarati

77. B. A. with Manipuri

78. B. A. with Assamese

79. B. A. with Sindhi

80. B. A. with Odia

81. Compulsory course (AECC) in English

82. Compulsory course (AECC) in Environmental Studies

83. B. A. (Honours) Hindustani Music(Vocal/Instrumental)

84. B. A. (Honours) Karnatak Music

85. B. A. (Honours) Percussion Music

86. B. A. with Hindustani Music (Vocal and Instrumental)

87. B. Sc. (Honours) Geology

88. B. Sc. (Honours) Statistics

2.4. List of Supplementary Courses

1. Bachelor of Tourism and Travel Management
2. B. A. (Honors) Multi Media and Mass Communication
3. Bachelor of Business Administration (Financial Investment Analysis)
4. B. A. (Honors)Journalism
5. B. A. (Honours) Hindi Journalism
6. B. A. with Apparel Design &Construction
7. B.A. with Development Communication and Extension
8. B.A. with Food Technology
9. B.A. with Human Development and Family Empowerment
10. B. A. with Nutrition and Health Education
11. B. A. with Resource Management & Design Application
12. B. Sc. (Honours) Food Technology
13. B. A. (Vocational Studies): Human Resource Management
14. B.A. (Vocational Studies): Tourism Management Three-Year (6-Semester) CBCS Programme
15. B.A. (Vocational Studies): Small and Medium Enterprise Three-Year (6- Semester)
16. B.A. (Vocational Studies): Material Management Three-Year (6-Semester)

17. B.A. (Vocational Studies) Marketing Management and Retail Business: Three- Year(6-Sem)
18. B.A. (Vocational Studies) Management and Marketing of Insurance: Three-Year (6-Sem)

2.5. Outlines of Choice Based Credit System:

1. **Core Course** (14 for honours courses; 4 discipline specific papers each for regular courses and 2 papers each for English and Hindi/MIL in B.A./B.Com): The papers under this category are going to be taught uniformly across all universities with 30% deviation proposed in the draft. The purpose of fixing core papers is to ensure that all the institutions follow a minimum common curriculum so that each institution/university adheres to common minimum standard. Also the course designed for papers under this category aim to cover the basics that a student is expected to imbibe in that particular discipline. A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
2. **Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

    2.1 Discipline Specific Elective (DSE) Course(4 for honours courses and 2 each for regular courses): Elective courses offered under the main discipline/subject of study is referred to as Discipline Specific Elective. The list provided under this category are suggestive in nature and each University has complete freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

    2.2. Dissertation/Project*: An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.

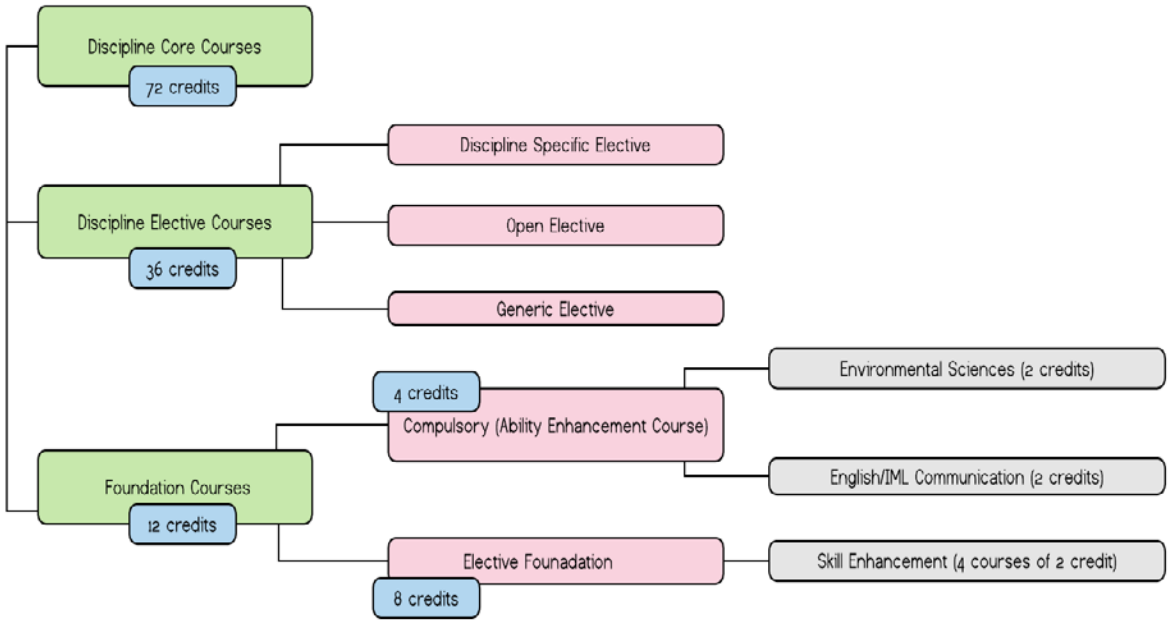
2.3. Generic Elective (GE) Course4 for honours courses and 2 each for B.A./B.Com. regular courses): An elective course chosen from an unrelated discipline/subject, with an intention to seek exposure beyond discipline/s of choice is called a Generic Elective. The purpose of this category of papers is to offer the students the option to explore disciplines of interest beyond the choices they make in Core and Discipline Specific Elective papers. The list provided under this category are suggestive in nature and each University has complete freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need. P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

3 **Ability Enhancement Courses (AEC)**: The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement; i. Environmental Science and ii. English/Hindi/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

3.1. Ability Enhancement Compulsory Courses (AECC): Environmental Science, English Communication/Hindi Communication/MIL Communication.

3.2. Skill Enhancement Courses (SEC) (minimum 2 for honours courses and 4 for regular courses): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work. The main purpose of these courses is to provide students life-skills in hands-on mode so as to increase their employability. The list provided under this category are suggestive in nature and each University has complete freedom to suggest their own papers under this category based on their expertise, specialization, requirements, scope and need.

4 **Practical/Tutorials** (One each with every core and discipline/generic specific elective paper): The list of practical provided is suggestive in nature and each university has the freedom to add/subtract/edit practical from the list depending on their faculty and infrastructure available. Addition will however be of similar nature.



2.6. Introducing Research Component in Under-Graduate Courses

Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.

2.7. Implementation:

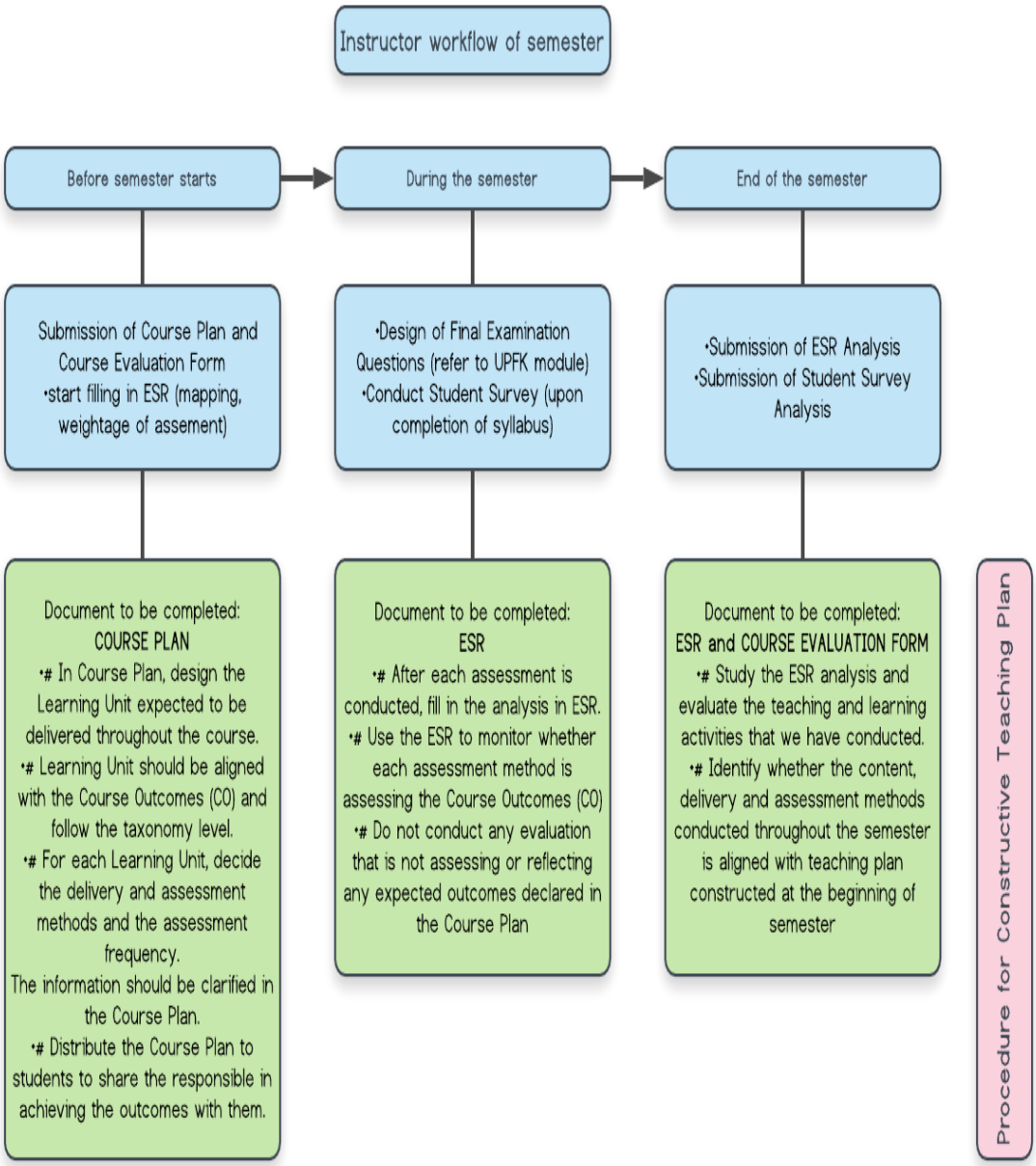
1. The CBCS may be implemented in Central/State Universities and the stakeholders agree to follow common minimum curriculum and syllabi of the core papers and given by the UGC. The allowed deviation from the syllabi being 30 % at the maximum.
2. The universities may be allowed to finally design their own syllabi for the core and elective papers subject to point no. 1. UGC may prepare a list of elective papers but the universities may further add to the list of elective papers they want to offer as per the facilities available.
3. Number of Core papers for all Universities has to be same for both UG Honors as well as UG regular courses.
4. Credit score earned by a student for any elective paper has to be included in the student's overall score tally irrespective of whether the paper is offered by the parent university (degree awarding university/institute) or not.

5. For the introduction of AE Courses, they may be divided into two categories:
   a) AE Compulsory Courses: The universities participating in CBCS system may have common curriculum for these papers. There may be one paper each in the1st two semesters viz. (i) English/Hindi/MIL Communication, (ii) Environmental Science.
   b) Skill Enhancement Courses: The universities may decide the papers they may want to offer from a common pool of papers decided by UGC or the universities may choose such papers themselves in addition to the list suggested by UGC. The universities may offer one paper per semester for these courses.
6. The university/Institute may plan the number of seats per elective paper as per the facility and infrastructure available.
7. An undergraduate degree with Honours in a discipline may be awarded if a student completes 14 core papers in that discipline, 2Ability Enhancement Compulsory Courses (AECC), minimum 2Skill Enhancement Courses (SEC) and 4 papers each from a list of Discipline Specific Elective and Generic Elective papers, respectively.
8. An undergraduate degree in Science disciplines may be awarded if a student completes 4 core papers each in three disciplines of choice, 2Ability Enhancement Compulsory Courses (AECC), minimum 4Skill Enhancement Courses (SEC)and 2 papers each from a list of Discipline Specific Elective papers based on three disciplines of choice selected above, respectively.
9. An Undergraduate degree in Humanities/ Social Sciences/ Commerce may be awarded if a student completes 4 core papers each in two disciplines of choice, 2 core papers each in English and Hindi/MIL, respectively, 2 Ability Enhancement Compulsory Courses (AECC), minimum 4 Skill Enhancement Courses (SEC), 2 papers each from a list of Discipline Specific Elective papers based on the two disciplines of choice selected above, respectively, and two papers from the list of Generic Electives papers.
10. For the purpose of computation of work-load the following mechanism may be adopted:
    i) 1 Credit = 1 Theory period of one hour duration
    ii) 1 Credit = 1 Tutorial period of one hour duration
    iii) 1 Credit = 1 Practical period of two hour duration
11. The credit(s) for each theory paper/practical/tutorial/project/dissertation will be as per the details given in A, B, C, D for B.Sc. Honours, B.A./B.Com. Honours, B. Sc. and

B.A./B.Com., respectively (Page 12onwards).

12. WhereveraUniversityrequiresthatanapplicantforaparticular M.A./M.Sc./Technical/Professional course should have studied a specific discipline at the undergraduate level, it is suggested that obtaining 24 credits in the concerned discipline at the undergraduate level may be deemed sufficient to satisfy such a requirement for admission to the M.A./M.Sc./Technical/Professional course.
13. The CBCS Committee unanimously recommended that after running the CBCS for undergraduate courses in Universities/Colleges/Institutes for one academic session UGC should review the course structure and syllabi in order to rectify anomalies, if any, based on the feedback from stake holders.

"CREDIT HOUR" - THE CARNEGIE UNIT									
Course Type	**Unit Value**	**Lecture Hours per**		**Lab Hours Per**		**By arrangement hours Per**		**Homework Hours Per**	
		Week	**Sem**	**Week**	**Sem**	**Week**	**Sem**	**Week**	**Sem**
LECTURE ONLY COURSES : HOMEWORK REQUIRED									
Lecture	1 unit	1	16					2	32
Lecture	2 units	2	32					4	64
Lecture	3 units	3	48					6	96
LEBORATORY ONLY COURSES ; NO HOMEWORK OR OTHER OUTSIDE WORK									
Lab	1 unit	3	48						
Lab	0.5 unit	1.5	24						
COURSES WITH BY ARRAGNGEMENT LAB HOURS ; HOMEWORK REQUIRED TO MAKE UP THE DIFFERENTS									
Lecture (w/by arr.)	1unit	1	16			2	32		
Lecture (w/by arr.)	1 unit	1	16			1	16	1	16
Lecture (w/by arr.)	1 unit					3	48		
Lecture (w/by arr.)	1unit					3	48		
Lecture (w/by arr.)	3 units	3	48			2	32	4	64
Lecture	1.5 units	1.5	24			2	32	1	16


Instructor workflow of semester
Before semester starts
During the semester
End of the semester
Submission of Course Plan and Course Evaluation Form
•start filling in ESR (mapping, weightage of assement)
•Design of Final Examination Questions (refer to UPFK module)
•Conduct Student Survey (upon completion of syllabus)
•Submission of ESR Analysis
•Submission of Student Survey Analysis
Document to be completed:
COURSE PLAN
•# In Course Plan, design the Learning Unit expected to be delivered throughout the course.
•# Learning Unit should be aligned with the Course Outcomes (CO) and follow the taxonomy level.
•# For each Learning Unit, decide the delivery and assessment methods and the assessment frequency.
The information should be clarified in the Course Plan.
•# Distribute the Course Plan to students to share the responsible in achieving the outcomes with them.
Document to be completed:
ESR
•# After each assessment is conducted, fill in the analysis in ESR.
•# Use the ESR to monitor whether each assessment method is assessing the Course Outcomes (CO)
•# Do not conduct any evaluation that is not assessing or reflecting any expected outcomes declared in the Course Plan
Document to be completed:
ESR and COURSE EVALUATION FORM
•# Study the ESR analysis and evaluate the teaching and learning activities that we have conducted.
•# Identify whether the content, delivery and assessment methods conducted throughout the semester is aligned with teaching plan constructed at the beginning of semester
Procedure for Constructive Teaching Plan

Details of Course Under B.Sc. (Honors)		
Course	**Credits**	
	Theory + Practical	Theory + Tutorial
1. Core Course		
Theory (14 papers)	14 x 4 =56	14 x 5 =70
Practical/Tutorial* (14 papers)	14 x 2 =28	14 x 1 =14
2.Elective Course		
A.1. Discipline Specific Elective (4 papers)	4 x 4 =16	4 x 5 =20
A.2. Discipline Specific Elective (Practical/Tutorial)* 4 papers	4 x 2 =8	4 x 1 =4
B.1. General Elective/Interdisciplinary (4 papers)	4 x 4=16	4 x 5=20
B.2. General Elective (Practical/Tutorial) (4 papers)	4 x 2=8	4 x 1=4
Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester		
3.Ability Enhancement Course		
1. Ability Enhancement Compulsory Course (AECC) (2 papers of 2 credit each) Environmental Science English/MIL Communication	2 x2=4	2 x 2=4
2. Skill Enhancement Course (SEC) (2 papers of 2 credit each) (Minimum 2)	2 x 2=4	2 x 2=4
Total Credits	140	140
Institute should evolve a system/policy about ECA/General Interest/Hobby/Sports/NCC/related course on its own. *wherever there is a practical there will be no tutorial and vice-versa		

A

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B. Sc.

Honours

	CORE COURSE (14)	Ability Enhancement Compulsory Course (AECC) (2)	SkillEnhancement Course (SEC) (2)	Elective: Discipline Specific DSE (4)	Elective: Generic (GE) (4)
I	C 1	(English/Hindi/MIL Communication)/ Environmental Science			GE-1
	C 2				
II	C 3	Environmental Science/(English/ Hindi/MIL Communication)			GE-2
	C 4				
III	C 5		SEC -1		GE-3
	C 6				
	C 7				
IV	C 8		SEC -2		GE-4
	C 9				
	C 10				
V	C 11			DSE-1	
	C 12			DSE -2	
VI	C 13			DSE -3	
	C 14			DSE -4	

Details of Course Under B.A./B.Com (Honors)		
Course	**Credits**	
	Theory + Practical	Theory + Tutorial
1. Core Course		
Theory (14 papers)	14 x 4 =56	14 x 5 =70
Practical/Tutorial* (14 papers)	14 x 2 =28	14 x 1 =14
2.Elective Course (8 papers)		
A.1. Discipline Specific Elective (4 papers)	4 x 4 =16	4 x 5 =20
A.2. Discipline Specific Elective (Practical/Tutorial)* 4 papers	4 x 2 =8	4 x 1 =4
B.1. General Elective/Interdisciplinary (4 papers)	4 x 4=16	4 x 5=20
B.2. General Elective (Practical/Tutorial) (4 papers)	4 x 2=8	4 x 1=4
Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6^{th} Semester		
3.Ability Enhancement Course		
1. Ability Enhancement Compulsory Course (AECC) (2 papers of 2 credit each) Environmental Science English/MIL Communication	2 x2=4	2 x 2=4
2. Skill Enhancement Course (SEC) (2 papers of 2 credit each) (Minimum 2)	2 x 2=4	2 x 2=4
Total Credits	140	140
Institute should evolve a system/policy about ECA/General Interest/Hobby/Sports/NCC/related course on its own. *wherever there is a practical there will be no tutorial and vice-versa		

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN

B.A./B.Com.Honours

	CORE COURSE (14)	**Ability Enhancement Compulsory Course (AECC) (2)**	**SkillEnhancement Course (SEC)(2)**	**Elective: Discipline Specific DSE (4)**	**Elective: Generic (GE) (4)**
I	C 1	(English/Hindi/MIL Communication)/ Environmental Science			GE-1
	C 2				
II	C 3	Environmental Science/(English/ Hindi/MIL Communication)			GE-2
	C 4				
III	C 5		SEC -1		GE-3
	C 6				
	C 7				
IV	C 8		SEC -2		GE-4
	C 9				
	C 10				
V	C 11			DSE-1	
	C 12			DSE -2	
VI	C 13			DSE -3	
	C 14			DSE -4	

C

Details of Course Under Undergraduate Programmes (B.Sc.)		
Course	**Credits**	
	Theory + Practical	Theory + Tutorial
1. Core Course		
Theory (12 papers) 04 courses from each of the 03 disciplines of choice	12 x 4 =48	12 x 5 =60
Practical/Tutorial* (12 papers) 04 Courses from each of the 03 Disciplines of choice	12 x 2 =24	12 x 1 =12
2.Elective Course (6 papers) 02 papers from each discipline of choice including paper of interdisciplinary nature	6x4=24	6x5=30
Elective Course Practical/Tutorials* (6 Practical/Tutorials*) 02 Papers from each discipline of choice including paper of interdisciplinary nature	6 x 2 =12	6 x1 =6
Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester		
3.Ability Enhancement Course		
1. Ability Enhancement Compulsory Course (AECC) (2 papers of 2 credit each) Environmental Science English/MIL Communication	2 x2=4	2 x 2=4
2. Skill Enhancement Course (SEC) (4 papers of 2 credit each)	4 x 2=8	4 x 2=8
Total Credits	120	120
Institute should evolve a system/policy about ECA/General Interest/Hobby/Sports/NCC/related course on its own. *wherever there is a practical there will be no tutorial and vice-versa		

C

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B. Sc.

	CORE COURSE (12)	**AbilityEnhancement CompulsoryCourse (AECC) (2)**	**Skill Enhancement Course (SEC)** (2)	**DisciplineSpecific Elective DSE(6)**
I	DSC- 1 A	(English/Hindi/MIL Communication)/ Environmental Science		
	DSC- 2 A			
	DSC- 3 A			
II	DSC- 1 B	Environmental Science/ (English/Hindi/MIL Communication)		
	DSC- 2 B			
	DSC- 3 B			
III	DSC- 1 C		SEC-1	
	DSC- 2 C			
	DSC- 3 C			
IV	DSC- 1 D		SEC-2	
	DSC- 2 D			
	DSC- 3 D			
V			SEC -3	DSE-1 A
				DSE-2 A
				DSE-3 A
I			SEC -4	DSE-1 B
				DSE-2 B
				DSE-3 B

D

Details of Course Under Undergraduate Programmes (B.A./B.Com.)		
Course	**Credits**	
	Theory + Practical	Theory + Tutorial
1. Core Course (12 papers)		
Two Papers-English Two papers-MIL Four papers-Discipline 1 Four papers-Discipline 2	12 x 4 =48	12 x 5 =60
Practical/Tutorial* (12 practical)	12 x 2 =24	12 x 1 =12
2.Elective Course (6 papers) Two papers -Discipline 1 specific Two papers-Discipline 2 specific Two papers-Interdisciplinary	6x4=24	6x5=30
Elective Course Practical/Tutorials* (6 Practical/Tutorials*) Two papers -Discipline 1 specific Two papers-Discipline 2 specific Two papers-Generic (Interdisciplinary) Two papers from each discipline of choice including papers of interdisciplinary nature	6 x 2 =12	6 x1 =6
Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester		
3.Ability Enhancement Course		
1. Ability Enhancement Compulsory Course (AECC) (2 papers of 2 credit each) Environmental Science English/MIL Communication	2 x2=4	2 x 2=4
2. Skill Enhancement Course (SEC) (4 papers of 2 credit each)	4 x 2=8	4 x 2=8
Total Credits	120	120
Institute should evolve a system/policy about ECA/General Interest/Hobby/Sports/NCC/related course on its own. *wherever there is a practical there will be no tutorial and vice-versa		

D

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B.A./B.Com

	CORE COURSE (12)	**Ability Enhancement Compulsory Course (AECC) (2)**	**Skill Enhancement Course (SEC)** (2)	**Discipline Specific Elective (DSE) (4)**	**Generic Elective (GE) (2)**
I	English/Hindi/ MIL-1	(English/Hindi/MIL Communication)/ EnvironmentalScience			
	DSC- 1 A				
	DSC- 2 A				
II	Hindi/MIL/English-1	Environmental Science/ (English/Hindi/MIL Communication)			
	DSC- 1 B				
	DSC- 2 B				
III	English/Hindi/ MIL-2		SEC -1		
	DSC- 1 C				
	DSC- 2 C				
IV	Hindi/MIL/ English-2		SEC -2		
	DSC- 1 D				
	DSC- 2 D				
V			SEC -3	DSE-1 A	GE-1
				DSE-2 A	
VI			SEC -4	DSE-1 B	GE-2
				DSE-2 B	

14. The Universities/Institutes may offer any number of choices of papers from different disciplines under Generic Elective and Discipline Specific Elective as per the availability of the courses/faculty.
15. Universities/Institutes may evolve a system/policy about Extra Curricular Activities/ General Interest and Hobby Courses/Sports/NCC/NSS/Vocational courses/related courses on their own.
16. A student can opt for more number of Elective and AE Elective papers than proposed under the model curriculum of UGC. However the total credit score earned will not exceed 160 credits for UG Honours and 140 credits for UG degree.
17. The new scheme of UG courses should be given due consideration while framing the admission eligibility requirement for PG/ Technical courses in Indian Universities/Institutions to ensure that students following inter and multi-disciplinary format under CBCS are not at a disadvantage It is suggested that wherever required, obtaining 24 credits in particular discipline may be considered as the minimum eligibility, for admission in the concerned discipline, for entry to PG/Technical courses in Indian Universities/Institutions.

Conversion of percentage into credit(s) and grade(s):The following illustrations could be taken as an example for computing SGPA and CGPA from percentage to credits for Honours courses in all disciplines, degree Program courses in Science subjects and degree Program courses in Humanities, Social Sciences and Commerce subjects:

2.8. Percentage to Grades and Grade Points

The following formula may be used to convert marks (%) into letter grades.

Let $\bar{X}$= mean of % age marks of all student appeared in the paper.

σ= Standard deviation m = % of marks obtained

Letter grade	Numerical grade	Formula
O (outstanding)	10	m≤$\bar{X}$+2.5σ
A+ (Excellent)	9	$\bar{X}$+2.0σ≤m€$\bar{X}$+2.5σ
A (Very Good)	8	$\bar{X}$+1.5σ≤m€$\bar{X}$+2.0σ
B+ (Good)	7	$\bar{X}$+1.0σ≤m€$\bar{X}$+1.5σ
B (Above average)	6	$\bar{X}$≤m€$\bar{X}$+ σ
C (Average)	5	$\bar{X}$—0.5σ ≤m€$\bar{X}$

D (Pass)	4	$\bar{X}-\sigma \leq m€\bar{X}-0.5\sigma$
F (Fail)	0	$m€\bar{X}-\sigma$
Ab (Absent)	0	

* Minor variations may be adjusted by the individual institution.

1. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.
2. For non credit courses 'Satisfactory' or "Unsatisfactory' shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.
3. The Universities can decide on the grade or percentage of marks required to pass in a course and also the CGPA required to qualify for a degree taking into consideration the recommendations of the statutory professional councils such as AICTE, MCI, BCI, NCTE etc.,
4. The statutory requirement for eligibility to enter as assistant professor in colleges and universities in the disciplines of arts, science, commerce etc., is a minimum average mark of 50% and 55% in relevant postgraduate degree respectively for reserved and general category. Hence,itisrecommendedthatthecut-offmarksforgradeBshallnotbelessthan50%and for grade B+, it should not be less than 55% under the absolute grading system. Similarly cut- off marks shall be fixed for grade B and B+ based on the recommendation of the statutory bodies (AICTE, NCTE etc.,) of the relevant disciplines.

Illustration of Computation of SGPA and CGPA and Format for Transcripts 2.B.Sc. / B.Com./ B.A.

Honors Course

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit X Grade)	SGPA(Credit Point/Credit)
Semester I					
C-1	06	A	8	48	
C-2	06	B+	7	42	
AECC-1	04	B	6	24	
GE-1	06	B	6	36	
Total	22			150	6.8 (150/22)

Semester II					
C-3	06	B	6	36	
C-4	06	C	5	30	
AECC -2	04	B+	7	28	
GE-2	06	A+	9	54	
Total	22			148	6.73 (148/22)
Semester III					
C-5	06	A+	9	54	
C-6	06	0	10	60	
C-7	06	A	8	48	
SEC-1	04	A	8	32	
GE-3	06	0	10	60	
Total	28			254	9.07 (254/28)
Semester IV					
C-8	06	B	6	36	
C-9	06	A+	9	54	
C-10	06	B	6	36	
SEC-2	04	A+	9	36	
GE-4	06	A	8	48	
Total	28			210	7.5 (210/28)
Semester V					
C-11	06	B	6	36	
C-12	06	B+	7	42	
DSE-1	06	0	10	60	
DSE-2	06	A	8	48	
Total	24			186	7.75 (186/24)
Semester VI					
C-13	06	A+	9	54	
C-14	06	A	8	48	
DSE-3	06	B+	7	42	
DSE-4	06	A	8	48	

Total	24			192	8.0 (192/24)
CGPA					
Grand Total	148			1140	7.7 (1140/148)

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit: 22; SGPA:6.8	Credit: 22; SGPA:6.73	Credit: 28; SGPA:9.07	Credit: 28; SGPA:7.5

Semester 5	**Semester 6**
Credit: 24; SGPA:7.75	Credit: 24; SGPA: 8.0

Thus, **CGPA = (**22 x 6.8 + 22 x 6.73 + 28 x 9.07 + 28 x 7.5 + 24 x 7.75 + 24 x 8.0)/ 148 = **7.7**

2. B. Sc. Course

Course	**Credit**	**Grade Letter**	**Grade Point**	**Credit Point (Credit X Grade)**	**SGPA(Credit Point/Credit)**
Semester I					
DSC-1A	06	B	6	36	
DSC-2A	06	B+	7	42	
DSC-3A	06	C	5	30	
AECC -1	04	B	6	24	
Total	22			132	6.0
Semester II					
DSC-1B	06	B	6	36	
DSC-2B	06	B	6	36	
DSC-3B	06	C	5	30	
AECC-2	04	A+	9	36	
Total	22			138	6.27

Semester III					
DSC-1C	06	A	8	48	
DSC-2C	06	A+	9	54	
DSC-3C	06	A	8	48	
SEC-1	04	A	8	32	
Total	22			182	8.27
Semester IV					
DSC-1D	06	C	5	30	
DSC-2D	06	B	6	36	
DSC-3D	06	B+	7	42	
SEC-2	04	A+	9	36	
Total	22			144	6.54
Semester V					
DSE-1A	06	B	6	36	
DSE-2A	06	A+	9	54	
DSE-3A	06	A	8	48	
SEC-3	04	B	6	24	
Total	22			162	7.36
Semester VI					
DSE-1B	06	B+	7	42	
DSE-2B	06	B	6	36	
DSE-3B	06	C	5	30	
SEC-4	04	C	5	20	
Total	22			128	5.82
CGPA					
Grand Total	132			886	6.71 (886/132)

Semester 1	Semester 2	Semester 3	Semester 4
Credit: 22; SGPA: 6.0	Credit: 22; SGPA:6.27	Credit: 22; SGPA:8.27	Credit: 22;SG PA: 6.54

Semester 5	Semester 6
Credit: 22; SGPA: 7.36	Credit: 22; SGPA: 5.82

Thus, **CGPA = (**22 x 6.0 + 22 x 6.27 + 22 x 8.27 + 22x 6.54 + 22 x 7.36 + 22 x 5.82)/ 132 = **6.71**

B.A./ B.Com. Course

Course	Credit	Grade Letter	Grade Point	Credit Point (Credit X Grade)	SGPA(Credit Point/Credit)
Semester I					
English-1	06	A	8	48	
DSC-1A	06	B	6	36	
DSC-2A	06	A	8	48	
AECC-1	04	B+	7	28	
Total	**22**			**160**	**7.27**
Semester II					
MIL-1	06	A+	9	54	
DSC-1B	06	B+	7	42	
DSC-2B	06	B+	7	42	
AECC-2	04	B	6	24	
Total	**22**			**162**	**7.36**

Semester III					
English -2	06	B	6	36	
DSC-1C	06	A	8	48	
DSC-2C	06	B	6	36	
SEC-1	04	A	8	32	
Total	**22**			**152**	**6.91**
Semester IV					
MIL - 2	06	B+	7	42	
DSC-1D	06	A+	9	54	
DSC-2D	06	A	8	48	
SEC-2	04	B	6	24	
Total	**22**			**168**	**7.63**
Semester V					
SEC-3	04	A+	9	36	
DSE-1A	06	A	8	48	
DSE-2A	06	A+	9	54	
GE-1	06	A+	9	54	
Total	**22**			**192**	**8.73**
Semester VI					
SEC-4	04	A+	9	36	
DSE-2A	06	B	6	36	
DSE-2B	06	A	8	48	
GE-2	06	A	8	48	
Total	**22**			**168**	**7.63**

Semester 1	Semester 2	Semester 3	Semester 4
Credit: 22; SGPA: 7.27	Credit: 22; SGPA:7.36	Credit: 22; SGPA:6.91	Credit: 22; SGPA: 7.63

Semester 5	Semester 6
Credit: 22; SGPA: 8.73	Credit: 22; SGPA:7.63

Thus, **CGPA = (**22 x 7.27 + 22 x 7.36 + 22 x 6.91 + 22 x 7.63 + 22 x 8.73 + 22 x 7.63)/ 132 =**7.59**

*Transcript (Format): Based on the above recommendations on Letter grades, grade points and SGPA and CCPA, the HEIs may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

ज्ञान-विज्ञान विमुक्तये

प्रो. (डॉ.) जसपाल एस. सन्धू
सचिव
Prof. Dr. Jaspal S. Sandhu
MBBS, MS (Ortho), DSM, FAIS, FASM, FAFSM, FFIMS, FAMS
Secretary

सत्यमेव जयते

विश्वविद्यालय अनुदान आयोग
University Grants Commission
(मानव संसाधन विकास मंत्रालय, भारत सरकार)
(Ministry of Human Resource Development, Govt. of India)
बहादुरशाह ज़फ़र मार्ग, नई दिल्ली-110002
Bahadur Shah Zafar Marg, New Delhi-110002
Ph.: 011-23239337, 23236288,
Fax : 011-23238858, email : jssandhu.ugc@nic.in

D.O.No.F.1-1/2016(Secy) **10th August, 2016**

Dear Sir/Madam,

The University Grants Commission has drafted and uploaded the Guidelines on Adoption of Choice Based Credit System (CBCS) on its website on 12.11.2014. Subsequently, the University Grants Commission also brought out Templates of 108 Undergraduate courses in which it semesterized the curricula and restructured syllabi in the form of progressive modules. They were also uploaded on the UGC's website. The CBCS provides for inbuilt flexibilities in which the students have a choice of pursuing courses of their choice in the form of electives. This not only broadens their horizons but also intends to make students well rounded in all spheres of development.

It has been more than a year since CBCS was introduced with the aforesaid stipulations. A number of institutions showed lots of enthusiasm in the implementation of the CBCS. So much so that while some universities have introduced CBCS at all the levels, others had done it at certain levels.

The UGC wishes to create a database regarding the effective implementation of CBCS in the institutions of higher learning. It is with that purpose that I have decided to approach you with the request to kindly confirm the implementation of CBCS in your esteemed University and affiliated Colleges by email at ugc.cbcs@gmail.com.

Please treat it as **Most Urgent** as the data is required by the Ministry of HRD for further analysis.

With kind regards,

Yours sincerely,

(Jaspal S. Sandhu)

The Vice-Chancellor of all Universities.

Copy to:

The Publication, UGC, New Delhi for uploading on the UGC website.

(Jaspal S. Sandhu)

UGC GUIDELINES ON ADOPTION OF CHOICE BASED CREDIT SYSTEM

UNIVERSITY GRANTS COMMISSION BAHADURSHAH ZAFAR MARG NEW DELHI — 110 002

http://www.ugc.ac.in/pdfnews/9555132_Guidelines.pdf

CHAPTER-3

UGC Guidelines on Adoption of Choice Based Credit System

---

1. Preamble

The University Grants Commission (UGC) has initiated several measures to bring equity, efficiency and excellence in the Higher Education System of country. The important measures taken to enhance academic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters.

The UGC has formulated various regulations and guidelines from time to time to improve the higher education system and maintain minimum standards and quality across the Higher Educational Institutions (HEIs) in India. The academic reforms recommended by the UGC in the recent past have led to overall improvement in the higher education system. However, due to lot of diversity in the system of higher education, there are multiple approaches followed by universities towards examination, evaluation and grading system. While the HEIs must have the flexibility and freedom in designing the examination and evaluation methods that best fits the curriculum, syllabi and teaching–learning methods, there is a need to devise a sensible system for awarding the grades based on the performance of students. Presently the performance of the students is reported using the conventional system of marks secured in the examinations or grades or both. The conversion from marks to letter grades and the letter grades used vary widely across the HEIs in the country. This creates difficulty for the academia and the employers to understand and infer the performance of the students graduating from different universities and colleges based ongrades.

The grading system is considered to be better than the conventional marks system and hence it has been followed in the top institutions in India and abroad. So, it is desirable to introduce uniform grading system. This will facilitate student mobility across institutions within and across countries and also enable potential employers to assess the performance of students. To bring in the desired uniformity, in grading system and method for computing the cumulative grade point

average (CGPA) based on the performance of students in the examinations, the UGC has formulated these guidelines.

2. Applicability of the Grading System

These guidelines shall apply to all undergraduate and postgraduate level degree, diploma and certificate programmes under the credit system awarded by the Central, State and Deemed to be universities in India.

3. Definitions of Key Words:

1. **Academic Year**: Two consecutive (one odd + one even) semesters constitute one academic year.
2. **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
3. Course: Usually referred to, as 'papers' is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.
4. **Credit Based Semester System (CBSS)**: Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.
5. **Credit Point**: It is the product of grade point and number of credits for a course.
6. **Credit**: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
7. **Cumulative Grade Point Average (CGPA)**: It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
8. **Grade Point**: It is a numerical weight allotted to each letter grade on a 10-pointscale.
9. **Letter Grade :–**It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F.

10. **Programme**: An educational programme leading to award of a Degree, diploma or certificate.
11. **Semester Grade Point Average (SGPA)**: It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
12. **Semester**: Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.
13. **Transcript or Grade Card or Certificate:** Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

4. Semester System and Choice Based Credit System

The Indian Higher Education Institutions have been moving from the conventional annual system to semester system. Currently many of the institutions have already introduced the choice based credit system. The semester system accelerates the teaching-learning process and enables vertical and horizontal mobility in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning, It is desirable that the HEIs move to CBCS and implement the grading system.

5. Types of Courses:

Courses in a programme may be of three kinds: Core, Elective and Foundation.

i. Core Course:-

There may be a Core Course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

ii. Elective Course:-

Elective course is a course which can be chosen from a pool of papers. It may be:

a. Supportive to the discipline of study
b. Providing an expanded scope
c. Enabling an exposure to some other discipline/domain
d. Nurturing student's proficiency/skill.

An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students. An elective may be "Discipline centric" or may be chosen from an unrelated discipline. It may be called an "Open Elective."

iii. Foundation Course:-

The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation. "Compulsory Foundation" courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines. Elective Foundation courses are value-based and are aimed at man-making education.

6. Examination and Assessment

The HEIs are currently following various methods for examination and assessment suitable for the courses and programmes as approved by their respective statutory bodies. In assessing the performance of the students in examinations, the usual approach is to award marks based on the examinations conducted at various stages (sessional, mid-term, end-semester etc.,) in a semester. Some of the HEIs convert these marks to letter grades based on absolute or relative grading system and award the grades. There is a marked variation across the colleges and universities in the number of grades, grade points, letter grades used, which creates difficulties in comparing students across the institutions. The UGC recommends the following system to be implemented in awarding the grades and CGPA under the credit based semester system.

7.Letter Grades and Grade Points:

i. Two methods -relative grading or absolute grading– have been in vogue for awarding grades in a course. The relative grading is based on the distribution (usually normal distribution) of marks obtained by all the students of the course and the grades are awarded based on a cut-off marks or percentile. Under the absolute grading, the marks are converted to grades based on pre-determined class intervals. To implement the following grading system, the colleges and

universities can use any one of the above methods.

ii. The UGC recommends a 10-point grading system with the following letter grades as given below:

Table 1: Grades and Grade Points

Grade Point	
O (Outstanding)	10
A+(Excellent)	9
A(Very Good)	8
B+(Good)	7
B(Above Average)	6
C(Average)	5
P (Pass)	4
F(Fail)	0
Ab (Absent)	0

iii. A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

iv. For non credit courses ‘Satisfactory’ or “Unsatisfactory’ shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

v. The Universities can decide on the grade or percentage of marks required to pass in a course and also the CGPA required to qualify for a degree taking into consideration the recommendations of the statutory professional councils such as AICTE, MCI, BCI, NCTE etc.,

vi. The statutory requirement for eligibility to enter as assistant professor in colleges and

universities in the disciplines of arts, science, commerce etc., is a minimum average mark of 50% and 55% in relevant postgraduate degree respectively for reserved and general category. Hence, it is recommended that the cut-off marks for grade B shall not be less than 50% and for grade B+, it should not be less than 55% under the absolute grading system. Similarly cut-off marks shall be fixed for grade B and B+ based on the recommendation of the statutory bodies (AICTE, NCTE etc.,) of the relevant disciplines.

8. Fairness in Assessment:

Assessment is an integral part of system of education as it is instrumental in identifying and certifying the academic standards accomplished by a student and projecting them far and wide as an objective and impartial indicator of a student's performance. Thus, it becomes bounden duty of a University to ensure that it is carried out in fair manner. In this regard, UGC recommends the following system of checks and balances which would enable Universities effectively and fairly carry out the process of assessment and examination.

i. In case of at least 50% of core courses offered in different programmes across the disciplines, the assessment of the theoretical component towards the end of the semester should be undertaken by external examiners from outside the university conducting examination, who may be appointed by the competent authority. In such courses, the question papers will be set as well as assessed by external examiners.
ii. In case of the assessment of practical component of such core courses, the team of examiners should be constituted on 50 – 50 % basis. i.e. half of the examiners in the team should be invited from outside the university conducting examination.
iii. In case of the assessment of project reports / thesis / dissertation etc. the work should be undertaken by internal as well as external examiners.

<u>Computation of SGPA and CGPA</u>

The UGC recommends the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits

of all the courses undergone by a student, i.e

SGPA (Si) = ∑(Ci x Gi) / ∑Ci

where Ci is the number of credits of the ith course and Gi is the grade point scored by the student in the ith course.

ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme,i.e.

CGPA = ∑(Ci x Si) / ∑ Ci

where Si is the SGPA of the ith semester and Ci is the total number of credits in that semester.

iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

Illustration of Computation of SGPA and CGPA and Format for Transcripts

i. Computation of SGPA and CGPA

Illustration for **SGPA**

Course	**Credit**	**Grade letter**	**Grade point**	**Credit Point** (Credit x Grade
Course 1	3	A	8	3 X 8 = 24
Course 2	4	B+	7	4 X 7 = 28
Course 3	3	B	6	3 X 6 = 18
Course 4	3	O	10	3 X 10 = 30
Course 5	3	C	5	3 X 5 = 15
Course 6	4	B	6	4 X 6 = 24
	20			139

Thus, **SGPA =139/20 =6.95**

Illustration for **CGPA**

Semester 1	**Semester 2**	**Semester 3**	**Semester 4**
Credit : 20; SGPA:6.9	Credit : 22; SGPA:7.8	Credit :25; SGPA:5.6	Credit : 26; SGPA:6.0

Semester 5	**Semester 6**		
Credit : 26 SGPA:6.3	Credit :25SGPA:8.0		

Thus, **CGPA =** 20 x 6.9 + 22 x 7.8 + 25 x 5.6 + 26 x 6.0 + 26 x 6.3 + 25 x 8.0

---------- = 144

ii. Transcript (Format): Based on the above recommendations on Letter grades, grade points and SGPA and CCPA, the HEIs may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

MINIMUM COURSE CURRICULUM

FOR

UNDERGRADUATE COURSES

UNDER CHOICE BASED CREDIT SYSTEM

http://www.ugc.ac.in/pdfnews/8023719_Guidelines-for-CBCS.pdf

CHAPTER-4
MINIMUM COURSE CURRICULUM FOR UNDERGRADUATE COURSES UNDER CHOICE BASED CREDIT SYSTEM

Background/Preamble:

Ministry of Human Resource Development (HRD), Govt. of India, has already initiated the process for developing New Education Policy (NEP) in our country to bring out reforms in Indian education system. University Grants Commission (UGC) participates more actively in developing National Education Policy, its execution and promotion of higher education in our country. The UGC has already initiated several steps to bring equity, efficiency and academic excellence in National Higher Education System. The important ones include innovation and improvement in course- curricula, introduction of paradigm shift in learning and teaching pedagogy, examination and education system.

The education plays enormously significant role in building of a nation. There are quite a large number of educational institutions, engaged in imparting education in our country. Majority of them have entered recently into semester system to match with international educational pattern. However, our present education system produces young minds lacking knowledge, confidence, values and skills. It could be because of complete lack of relationship between education, employment and skill development in conventional education system. The present alarming situation necessitates transformation and/or redesigning of education system, not only by introducing innovations but developing "learner-centric approach in the entire education delivery mechanism and globally followed evaluation system as well.

Majority of Indian higher education institutions have been following marks or percentage based evaluation system, which obstructs the flexibility for the students to study the subjects/courses of their choice and their mobility to different institutions. There is need to allow the flexibility in education system, so that students depending upon their interests and aims can choose inter- disciplinary, intra-disciplinary and skill-based courses. This can only be possible when choice based credit system (CBCS),

an internationally acknowledged system, is adopted. The choice based credit system not only offers opportunities and avenues to learn core subjects but also exploring additional avenues of learning beyond the core subjects for holistic development of an individual. The CBCS will undoubtedly facilitate us bench mark our courses with best international academic practices. The CBCS has more advantages than disadvantages.

Advantages of the choice based credit system:

- Shift in focus from the teacher-centric to student-centric education.
- Student may undertake as many credits as they can cope with (without repeating all courses in a given semester if they fail in one/more courses).
- CBCS allows students to choose inter-disciplinary, intra-disciplinary courses, skill oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and more flexibility for students).
- CBCS makes education broad-based and at par with global standards. One can take credits by combining unique combinations. For example, Physics with Economics, Microbiology with Chemistry or Environment Science etc.
- CBCS offers flexibility for students to study at different times and at different institutions to complete one course (ease mobility of students). Credits earned at one institution can be transferred.

Disadvantages:

- Difficult to estimate the exact marks
- Workload of teachers may fluctuate
- Demand good infrastructure for dissemination of education

CHOICE BASED CREDIT SYSTEM (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In

order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

Tentative list of Undergraduate Disciplines/Courses to be covered under CBCS developing common minimum structure and syllabi:

BACHELOR COURSES UNDER CBCS IN INDIA

S.NO.	UNDERGRADUATE COURSES	
1	**Arts and Humanities**	1. Hindi 2. Sanskrit 3. Modern Indian Language- Punjabi 4. English 5. Sociology 6. Public Administration 7. Defense and Strategic studies 8. History 9. Geography 10. Economics 11. History and Tourism 12. Philosophy 13. Political Science 14. Music 15. Journalism 16. Psychology 17. Mathematics 18. Home Science 19. Education

2	**Commerce and Management**	20. Business Economics 21. Commerce 22. Banking and Insurance 23. Accounting and Finance 24. Financial Markets 25. Company and Compensation law 26. Business Administration 27. Labor Management 28. Tourism and Travel management
3	**Science**	29. B.Sc. Medical/Life Sciences 30. Chemistry 31. Physics 32. Botany 33. Zoology 34. Biotechnology 35. Microbiology 36. Biochemistry 37. Computer Science 38. Environmental Science 39. Food Technology 40. Electronic Science 41. Information Technology 42. Forensic Science 43. Biomedical Science

		44. Physical Science 45. Operational Research 46. Statistics 47. Anthropology
5	**Others**	48. LLB 49. BCA 50. B.Lib 51. B.Ed 52. B.El.Ed 53. Multimedia and Communication 54. Fine Arts 55. Performing Arts 56. Physical Education and Health 57. Foreign Languages

Outline of Choice Based Credit System:

1. **Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
2. **Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

Dissertation/Project: An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own

with an advisory support by a teacher/faculty member is called dissertation/project.

Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.

P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

3. **Ability Enhancement Courses (AEC):** The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement; i. Environmental Science and ii. English/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

Ability Enhancement Compulsory Courses (AECC): Environmental Science, English Communication/MIL Communication.

Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

* **Introducing Research Component in Under-Graduate Courses**

Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.

Implementation:

1. The CBCS may be implemented in Central/State Universities subject to the condition that all the stakeholders agree to common minimum syllabi of the core papers and at least follow common minimum curriculum as fixed by the UGC. The allowed deviation from the syllabi being 20 % at the maximum.
2. The universities may be allowed to finally design their own syllabi for the core and elective papers subject to point no. 1. UGC may prepare a list of elective papers but the universities may further add to the list of elective papers they want to offer as per the facilities available.
3. Number of Core papers for all Universities has to be same for both UG Honors as well as UG

Program.

4. Credit score earned by a student for any elective paper has to be included in the student's overall score tally irrespective of whether the paper is offered by the parent university (degree awarding university/institute) or not.
5. For the introduction of AE Courses, they may be divided into two categories:

   a) AE Compulsory Courses: The universities participating in CBCS system may have common curriculum for these papers. There may be one paper each in the 1st two semesters viz. (i) English/MIL Communication, (ii) Environmental Science.

   b) Skill Enhancement Courses: The universities may decide the papers they may want to offer from a common pool of papers decided by UGC or the universities may choose such papers themselves in addition to the list suggested by UGC. The universities may offer one paper per semester for these courses.
6. The university/Institute may plan the number of seats per elective paper as per the facility and infrastructure available.
7. An undergraduate degree with Honours in a discipline may be awarded if a student completes 14 core papers in that discipline, 2 Ability Enhancement Compulsory Courses (AECC), minimum 2 Skill Enhancement Courses (SEC) and 4 papers each from a list of Discipline Specific Elective and Generic Elective papers respectively.
8. An undergraduate Program degree in Science disciplines may be awarded if a student completes 4 core papers each in three disciplines of choice, 2 Ability Enhancement Compulsory Courses (AECC), minimum 4 Skill Enhancement Courses (SEC) and 2 papers each from a list of Discipline Specific Elective papers based on three disciplines of choice selected above, respectively.
9. An Undergraduate program degree in Humanities/ Social Sciences/ Commerce may be awarded if a student completes 4 core papers each in two disciplines of choice, 2 core papers each in English and MIL respectively, 2 Ability Enhancement Compulsory Courses (AECC), minimum 4 Skill Enhancement Courses (SEC), 2 papers each from a list of Discipline Specific Elective papers based on the two disciplines of choice selected above, respectively, and two papers from the list of Generic Electives papers.
10. The credit(s) for each theory paper/practical/tutorial/project/dissertation will be as per the details given in A, B, C, D for B.Sc. Honours, B.A./B.Com. Honours, B.Sc. Program and B.A./B.Com.

Program, respectively.

11. WhereveraUniversityrequiresthatanapplicantforaparticular M.A./M.Sc./Technical /Professional course should have studied a specific discipline at the undergraduate level, it is suggested that obtaining 24 credits in the concerned discipline at the undergraduate level may be deemed sufficient to satisfy such a requirement for admission to the M.A./M.Sc./Technical/Professional course.

Structure of B.Sc. Honours Botany under CBCS

Core Course

1. Algae and Microbiology
2. Cell Biology
3. Mycology and Phytopathology
4. Archegoniate
5. Morphology and Anatomy
6. Economic Botany
7. Basics of Genetics
8. Molecular Biology
9. Ecology
10. Plant Systematics
11. Reproductive Biology of Angiosperms
12. Plant Physiology
13. Plant Metabolism
14. Plant Biotechnology

Discipline Centric Elective (Any four)

1. Bio-molecules
2. Analytical Techniques in Plant Sciences
3. Bioinformatics
4. Stress Biology
5. Plant Breeding
6. Natural Resource Management
7. Horticultural Practices and Post-Harvest Technology

8. Research Methodology
9. Industrial and Environmental Microbiology
10. Biostatistics

Generic Elective (Any four)

1. Biodiversity (Microbes, Algae, Fungi and Archegoniate)
2. Plant Ecology and Taxonomy
3. Plant Anatomy and Embryology
4. Economic Botany and Biotechnology
5. Plant Diversity and Human Welfare
6. Environmental Biotechnology

Ability Enhancement Course Compulsory

1. Environmental Science
2. English/MIL Communication

Elective (Any two)

1. Mushroom Culture Technology
2. Bio-fertilizers
3. Herbal Technology
4. Nursery and Gardening
5. Floriculture
6. Ethno botany

Structure of B.Sc. Programme (Life Sciences)/ B.Sc. Medical under CBCS

Core Courses (12)

Botany

1. Biodiversity (Microbes, Algae, Fungi and Archegoniate)
2. Cell and Molecular Biology
3. Plant Anatomy and Embryology
4. Plant Physiology and Metabolism

Zoology

1. Animal Diversity-I
2. Animal Diversity-II
3. Genetics and Evolution
4. Physiology and Biochemistry

Chemistry

1. Bonding
2. Conceptual Organic Chemistry
3. Thermodynamics, chemical equilibrium and electrochemistry
4. Spectroscopy

Discipline Centric Electives

Botany (Any two)

1. Economic Botany and Biotechnology
2. Plant Ecology and Taxonomy
3. Analytical Techniques in Plant Sciences
4. Bioinformatics
5. Research Methodology

Zoology (Any two)

1. Animal Behaviour
2. Reproductive Biology
3. Developmental Biology
4. Biotechnology
5. Immunology
6. Applied Zoology

Chemistry (Any two)

1. Molecules of Life
2. Bioinorganic, environmental & green chemistry
3. Bioinorganic, environmental & green chemistry
4. Analytical methods in chemistry

Ability Enhancement Course

Compulsory

1. Environmental Science
2. English/MIL Communication

Elective (Any four)

1. Mushroom Culture Technology
2. Bio-fertilizers
3. Herbal Technology
4. Nursery and Gardening
5. Floriculture
6. Ethno botany

Workshop on
Outcome Based Education
(OBE)

Workshop Material

By

Prof.N.J.Rao & Dr. K. Rajanikanth, Bangalore

CHAPTER-5
Outcome Based Education

Introduction

Good teachers want good learning to occur as a result of their teaching. Good learning means, besides recalling information, acquiring the ability of problem solving, and critical and creative thinking. Students learn well when

- they are provided information about the course outcomes (what the students should be able to do at the end of the course), their responsibilities, and the criteria used to evaluate their performance
- the assessment is in alignment with the stated outcomes
- instructional activities are designed and conducted to facilitate them to acquire the stated outcomes and they are actively engaged and challenged at the right level

A course in a General Higher Education program in India needs to be designed and conducted to facilitate the students to meet the identified Course Outcomes. The Course Outcomes address a subset of Program Outcomes identified by the University or the Autonomous Institute that offers the Program. Also, the Course Outcomes address Program Specific Outcomes identified by the Branch/Department. The three-day workshop aims at facilitating the participants to write Course Outcomes of courses of their choice and Program Specific Outcomes in OBE-CBCS of UGC and NAAC Accreditation frameworks.

Choice Based Credit System of UGC and NAAC Accreditation

Educational purposes

- The educational purposes of general higher education programs are to be identified by the University or by the institution if it is autonomous offering the programs in the framework provided by the University Grants Commission (UGC) and National Assessment and Accreditation Council of India (NAAC), and sometimes moderated by the Higher Education Councils of States
- These educational purposes are also known as Learning Outcomes or simply Outcomes

UGC Action Plan

Academic and Administrative Reforms (Quote)

"Curricular flexibility and learners' mobility is an issue that warrants our urgent attention. These can be addressed by introducing credit based courses and credit accumulation.

In order to provide with some degree of flexibility to learners, we need to provide for course duration in terms of credit hours and also a minimum as well as a maximum permissible span of time in which a course can be completed by a learner…

Choice-Based Credit System (CBCS) eminently fits into the emerging socio-economic milieu, and could effectively respond to the educational and occupational aspirations of the upcoming generations.

In view of this, institutions of higher education in India would do well to invest thought and resources into introducing CBCS.

Aided by modern communication and information technology, CBCS has a high probability to be operational efficiently and effectively — elevating learners, institutions and higher education system in the country to newer heights…".

UGC

is most importantly concerned with

- Curricular flexibility
- Learners' mobility
- Choice Based Credit System
- Use of Information and Communication Technology

Advantages of CBCS

- Represents a shift in focus from teaching to learning since the workload is based on the investment of time in learning.
- Records student's workload realistically.
- Helps self-learning.
- Students may undertake as many credits as they can cope without repeating all the courses in a given semester if they are unsuccessful in one or more courses (papers).

- Offers more flexibility to the students allowing them to choose inter-disciplinary (known as Extra-Departmental or Open) courses along with major courses, which makes education more broad-based.
- Facilitates students' mobility.

Salient features of CBCS

- The amount of learning indicated by a credit value is based on an estimate using the idea of hours of learning (classroom sessions + student effort outside the classroom)
- Transfer of credits which have already been awarded to the student in another program within the university, or towards a program in a different institution (vide clause 37 of the Regulation).
- Student shall be graded in each course with 7 deferent grades in a scale of 10

CBCS of UGC

Important features:

- Credits
- Choice
- 1 Credit = 1 Theory period of one hour per week over a semester
- 1 Credit = 1 Tutorial period of one hour per week over a semester
- 1 Credit = 1 Practical period of two hour per week over a semester

Credits of the Program

UGC prescribes

- 120 credits in a prescribed structure constitute the minimum requirement for UG 3-year degree
- 120 – 140 credits for a UG 3-year Degree Program
- 140 credits in a prescribed structure constitute the minimum requirement for UG (honors) 3-year degree
- 140-160 credits for a 3-year UG (Honors) Degree Program
- The courses can be offered as 5:1:0, 4:0:2, 4:0:0, 3:1:0, 3:0:1, 2:0:2, 3:0:0, 2:0:0 and 0:0:2 (L:T:P).

Types of Courses

- Core
- Electives
- Foundation

Core Courses

- Core courses are to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.
- There may be a Core Course in every semester.
- They need to be offered as 6-credit courses (4:0:2 or 5:1:0)
- Total number of core credits: 72
- 4 Courses (Theory and Practicals/Tutorial from each of the 3 disciplines of choice)
- Four courses from the main discipline are approximately prescribed by UGC

Electives

A course which can be chosen from a pool. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.
- An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students.
- An elective may be "Discipline centric" or may be chosen from an unrelated discipline and may be called an "Open Elective."
- Two papers from each discipline of choice including a course of interdisciplinary nature.
- They need to be offered as 6-credit courses (4:0:2 or 5:1:0)
- 2 Courses (Theory and Practicals/Tutorial from each of the 3 disciplines of choice)
- Optional Dissertation or project work in place of one Discipline elective paper (6 credits) in 6th Semester

Foundation Courses

Compulsory Foundation (Ability Enhancement Course Compulsory) (AECC):

- Courses based upon the content that leads to Knowledge enhancement.

- Mandatory for all disciplines.
  - Environmental Science (2 Credits)
  - English/IML Communication (2 Credits)
- Elective Foundation (Skill Enhancement Course (SEC): courses are value-based and are aimed at man-making education.
- 4 Courses of 2 Credits each
- They can also be discipline based

University/Autonomous College

Board of Studies of the Program of the University/College

- Decides the proportions of CIE (Continuous Internal Evaluation) and SEE (Semester End Examination)
- Decides all aspects of the curriculum including syllabus of all core and elective courses, practicals and text books
- Arranges for the design of examination papers
- Organizes for the evaluation of answer scripts
- Announces the grades of students
- Development and implementation of the course
- CIE and to a great extent SEE

National Assessment and Accreditation Council (NAAC)

Core Values

- Contributing to National Development
- Fostering global competencies among students
- Inculcating a value system among students
- Promoting the use of technology in teaching-learning and governance
- Quest for excellence

It requires that every University/autonomous institute identify the Program Outcomes (which are program non-specific) and Program Specific Outcomes of every program it offers.

Outcomes

- Outcomes represent what the learner should be able to do as consequence learning Outcomes of a formal program are stated as
- Program Outcomes (Graduate Attributes)
- Program Specific Outcomes

Outcomes and OBE

Learning

- Learning is acquiring new knowledge, behaviors, skills, values, preferences or understanding, and may involve synthesizing different types of information.

- Learning is the process whereby knowledge is created (knowledge production) through the transformation of experience. (Kolb)

Outcomes of Learning

- Outcomes
- Learning Outcomes
- Intended Learning Outcomes
- Instructional Objectives
- Educational Objectives
- Behavioral Objectives
- Performance Objectives
  - Terminal Objectives
  - Subordinate Skills,
  - Subordinate Objectives
  - General Instructional Objectives
  - Specific Learning Outcomes
  - Competencies

What are Outcomes?

- An outcome of an education is what the student should be able to do at the end of a program/ course/ instructional unit.
- Outcome is an effective ability, including attributes, skills and knowledge, to successfully carry out some activity which is totally identified.

Outcome Based Education (OBE)

- OBE model was introduced by William Spady in early 90s for American School system and eventually adapted by higher education systems.
- Outcome-based education is an approach to education in which decisions about the curriculum and instruction are driven by the exit learning outcomes that the students should display at the end of a program or a course.
- Establish the conditions and opportunities within the system that enable and encourage all students to achieve those essential outcomes.
- A system based on outcomes gives top priority to ends, purposes, learning, accomplishments, and results.

Advantages of OBE

- Relevance—Outcome-based education promotes fitness for practice and education for capability.
- Discourse—The process of identification of the outcomes within an institution promotes discussion of fundamental questions
- Clarity—An explicit statement of what the educational process aims to achieve clarifies the curriculum for both students and teachers, and provides a focus for teaching and learning.
- Provision of a Framework—Outcome-based education provides a robust framework for integration of the curriculum.
- Accountability—By providing an explicit statement of what the curriculum is setting out to achieve, outcome-based education emphasizes accountability.

- Self-Directed Learning—If students are clear about what they are trying to achieve, they can take more responsibility for their own learning. Outcome-based education thus promotes a student-centered approach to learning and teaching.
- Flexibility—Outcome-based education does not specify educational strategies or teaching methods.
- Guide for Assessment—The outcomes provide the framework for student examinations.
- Facilitates Curriculum Evaluation—The outcomes provide benchmarks against which the curriculum can be judged.

Reservations about OBE

- It is against the spirit of education
- It is a straight jacket

Unit of Learning

A unit of learning may be

- A **few hours of self/classroom learning activity**,
- A one semester course
- A formal program of two to four years duration.

Learning Unit

is characterized by stating

- **Learning Outcomes -** What the student should be able to do at the end of the unit
- **Assessment -** How do you propose to measure the ability of a student to do what he is expected to do
- **Instruction -** How do you propose to facilitate the students to acquire the ability to do what they are expected to do

Outcomes

- Outcomes are the abilities the students acquire at the end of the program/course/instructional unit
- Outcomes provide the basis for an effective interaction among stakeholders
- In outcome-based education, “product defines process”.

- It is the results-oriented thinking and is the opposite of input-based education where the emphasis is on the educational process and where we are happy to accept whatever is the result
- **Outcome-based education is not simply producing outcomes for an existing curriculum.**

Students learn well when

- They are clear about what they should be able to do at the end of a course
- Assessment is in alignment with what they are expected to do
- Instructional activities are designed and conducted to facilitate them to acquire what they are expected to achieve

Levels of Outcomes

Program Outcomes: POs are statements that describe what the students graduating from general programs should be able to do

Program Specific Outcomes: PSOs are statements that describe what the graduates of a specific program should be able to do

Course Outcomes: COs are statements that describe what students should be able to do at the end of a course

NAAC requires that all teaching learning processes are Outcome

Based **Program Outcomes**

- Program Outcomes (POs) are outcomes that are non-specific to a program.
- POs characterise the knowledge, skills and attitudes all students are require to attain at the time of graduation from any of a program.
- POs need to be identified by the University/Institute offering general programs.

Program Outcomes (samples)

- **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

- **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

Program Outcomes

NAAC Accreditation requires that all higher education institutions (Universities, Autonomous Institutions and Affiliated Institutions) identify their own Program Outcomes and Program Specific Outcomes. Unlike professional programs, the accreditation agency does not formally identify the Program Outcomes of General Programs. However, all organizations across the world associated with higher education identified very similar Program Outcomes. They may vary in the number of outcomes and their wording.

Suggested Program Outcomes for General Undergraduate Programs: Students of all undergraduate general degree programs at the time of graduation will be able to

PO1. **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2. **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. **Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO4. **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

PO5. **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PO6. **Social Interaction**: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO7. **Computational Thinking**: Understand data-based reasoning through translation of data into abstract concepts using computing technology-based tools.

PO8. **Ethics**: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO9. **Problem Solving**: Identify and formulate problems, and integrate resources to reach decisions, make recommendations or implement action plans.

PO10. **Global Perspective**: Understand the economic, social and ecological connections that link the world's nations and people.

As designing educational programs, to attain well stated program level outcomes, is a new experience in India, the Institutions may restrict themselves initially to the first five. Ideally all the ten program outcomes are relevant in the present-day context. Institutions are free to select the POs and reword them. However, the selected POs should be applicable to all the programs the Institute offers.

Recommended initial set of POs for General Undergraduate Programs

PO1. **Critical Thinking**: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2. **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

PO3. **Effective Citizenship**: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO4. **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

PO5. **Self-directed and Life-long Learning**: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

- Program Specific Outcomes (PSOs) are outcomes that are specific to a program.
- PSOs characterise the specificity of the core (core courses) of a program.
- PSOs of a general program can only be two to four in number.

PROGRAM SPECIFIC OUTCOMES-Samples

Program: B.A. Economics

PSO1 Understand to use empirical evidence to evaluate the validity of an economic argument.

PSO2 Communicate effectively in written, oral and graphical form about specific issues.

PSO3 Analyze economic problems that have implications on different sectors of national economy.

PSO4 Apply economic analysis to everyday problems in real world situations, to understand current events and evaluate critically various policy proposals.

Program: B.A. English

PSO1 Understand the history of English Language and Literature, the flux in language and different literary eras

PSO2 Analyse the use of Media in English Language to impart and communicate culture, tradition and life effectively

PSO3 Understand the contemporary issues to read the signs of the time and respond to it effectively

PSO4 Develop the skills for journalistic and creative writings, and critical analysis of literary pieces

Program: B.A.English Language and Literature

PSO1 Understand and interpret the texts that are at the heart of the diverse traditions of the English Language

PSO2 Understand the context of literature as a basis of literary enquiry. The contexts include: the influences of culture, race, gender, environment and sustainability and human values; genre, literary tradition and historical periods; literary production and the insights of literary theories

PSO3 Understand major literary works, genres, periods and critical approaches to British, Indian and World literatures

PSO4 Develop and carry out research projects based on prescribed areas of study

Program: B.A.Malayalam

PSO1 Understand ancient ,modern postmodern, literature in malayalam.

PSO2 Understand Malayalam prose, fiction, drama & short stories.

PSO3 Analyse ancient and modern literature

PSO4 Compare ancient, modern and postmodern literary works in malayalam

Program: B.A. History

PSO1 Understand basic concepts of Historiography.

PSO2 Understand concepts in Indian History and Kerala History.

PSO3 Develop knowledge in World History and international affairs.

PSO4 Develop knowledge on Informatics.

PSOs: BSc Zoology (Sample)

PSO1. Understand the nature and basic concepts of cell biology, Biochemistry, Taxonomy and ecology.

PSO2. Analyse the relationships among animals, plants and microbes

PSO3. Perform procedures as per laboratory standards in the areas of Biochemistry, Bioinformatics, Taxonomy, Economic Zoology and Ecology

PSO4. Understand the applications of biological sciences in Apiculture, Aquaculture, Agriculture and Medicine

General UG Programs

Program Specific Outcomes

– PSOs represent what the students should be able to do at the time of graduation from aspecific program.
– PSOs are program specific, 2 to 4 in number, and need to be defined following a well-documented process.
– PSOs characterise the specificity of the core (core courses) of a program.

Structure of PSO Statements

- ☐ The PSO statement should start with one or more action verbs.
- ☐ The action verbs should be followed by clearly identified technical objects, and if required by the conditions under which the actions are to be performed.

Some examples of action verbs

- ☐ Formulate, specify, conceive, design, plan, architect, build, implement, test, operate
- ☐ Select
- ☐ Analyse, determine, estimate, calculate

Samples

BSc in Botany

PSO1. Understand the nature and fundamental concepts in methodology of science, plant systematics, ecology, anatomy, cell biology, physiology, molecular biology, genetics, plant breeding, biotechnology and bioinformatics.

PSO2. Understand the relationships among lower and higher group of plants.

PSO3. Understand the applications of biology in Horticulture, plant breeding, biotechnology and bioinformatics.

PSO4. Perform laboratory procedures as per standard protocols in the areas of physiology, anatomy, taxonomy, mycology, cell and molecular biology, plant breeding, biotechnology, bioinformatics, biochemistry and ecology.

BSc in Zoology

PSO1. Understand biological diversity through the systematic classification and their relative role in the sustainability of the environment

PSO2. Understand the application of the principles of aquaculture, sericulture, apiculture, poultry, piggery, rabbit farming, dairying and verminculture for the economic prosperity of the society.

PSO3. Understand the levels of life related concepts of physiology, cell biology, genetics, bio-informatics, molecular biology, endocrinology, developmental biology, biochemistry, and immunology

PSO4. Understand the oneness among the plants, animals and microbes, and their interaction among themselves and deterioration of environment due to anthropogenic activities

BSc in Aquaculture

PSO1. Understand the basic concepts and principles of the science of Aquaculture and aquaculture practices

PSO2. Culture indigenous cultivable fishes, crustaceans, molluscs, seaweeds, Holothurians and live feeds applying the principles of aquaculture.

PSO3. Understand the frontier areas of aquaculture nutrition, Reproductive Physiology, Endocrinology, Fish processing and pathology.

PSO4. Understand the concepts of capture and culture fishery and the role played by fisheries in the economy and food security of the nation.

BSc Electronics

PSO1. Design simple analog and digital signal processing, circuits and systems using state of the art components.

PSO2. Design embedded systems for simple applications

PSO3. Understand functioning of digital, analog and fibre optic communication systems.

PSO4. Understand the concepts in signal processing and computer networking of Mass Communication in Extension.

Taxonomy of Learning: Cognitive Levels

Learning Outcomes

- ☐ Learning outcomes are what the learners expected to do at the end of a program, a course or an instructional unit.
- ☐ Outcomes of courses and instructional units can be more conveniently written if there is a well accepted taxonomy of learning.
- ☐ It is desirable to have a taxonomy that is applicable to learning outcomes, assessment and teaching.
- ☐ Outcome statements should have a well defined structure.

Taxonomy of Learning

- ☐ At course level, it would help addressing all 3 concerns – Course Outcomes, Instruction, and Assessment- and also in addressing the issue of alignment among these three concerns.
- ☐ Several taxonomies exist: Bloom, SOLO, Fink, Gagne, Marazano & Kendall etc.
- ☐ All taxonomies are attempts to give a structure to the processes involved in learning based on observations of learning behaviors and the limited understanding of how the brain functions.
- ☐ Our focus is on Revised Bloom's Taxonomy.

Bloom's Taxonomy: Where it all started

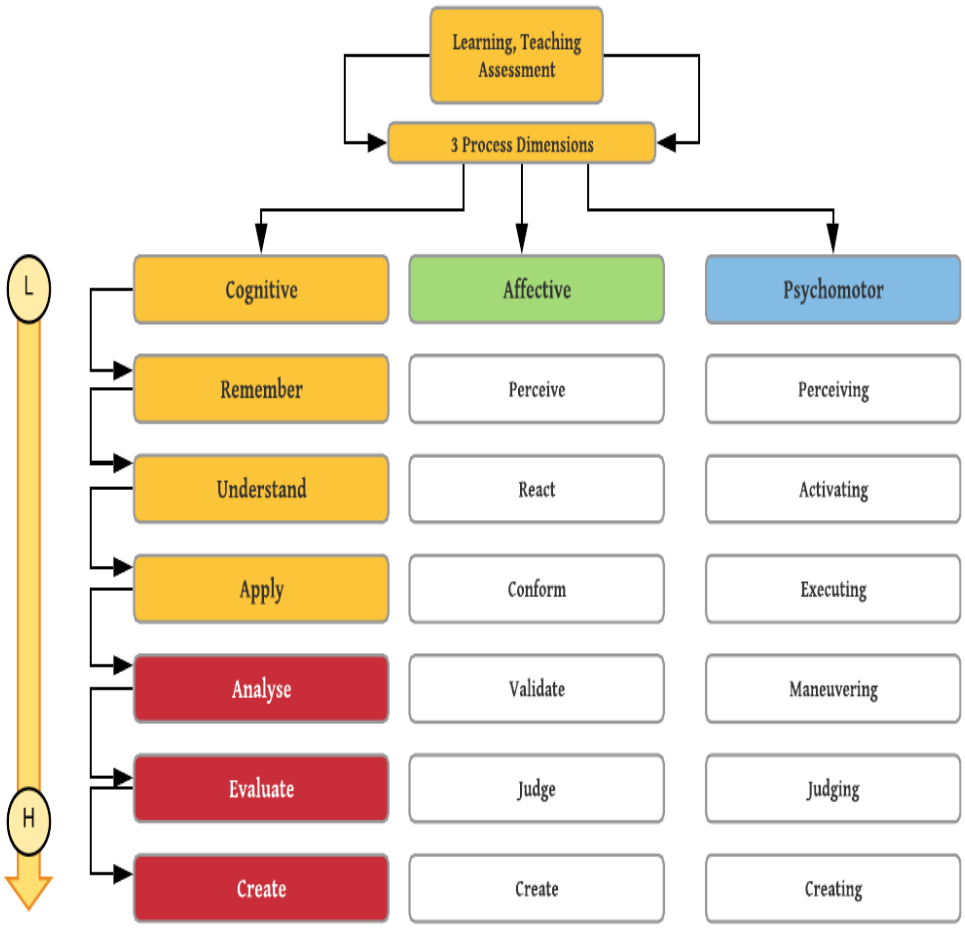
- ☐ Benjamin Bloom was working in early 1950s on the development of specifications through which educational objectives could be organized according to their cognitive complexity.
- ☐ He proposed that any given task favours one of three psychological domains: cognitive, affective, or psychomotor.
- ☐ The cognitive domain deals with a person's ability to process and utilize information in a meaningful way.
- ☐ The affective domain relates to the attitudes and feelings that result from or influence the learning process.
- ☐ The psychomotor domain involves manipulative or physical skills.

Domains of Learning

- ☐ **Cognitive**
  - Cognitive Processes
  - Knowledge Categories
- ☐ **Affective (Emotion)**
- ☐ **Psychomotor**

All three domains are involved to varying degrees in all intended learning experiences and activities.

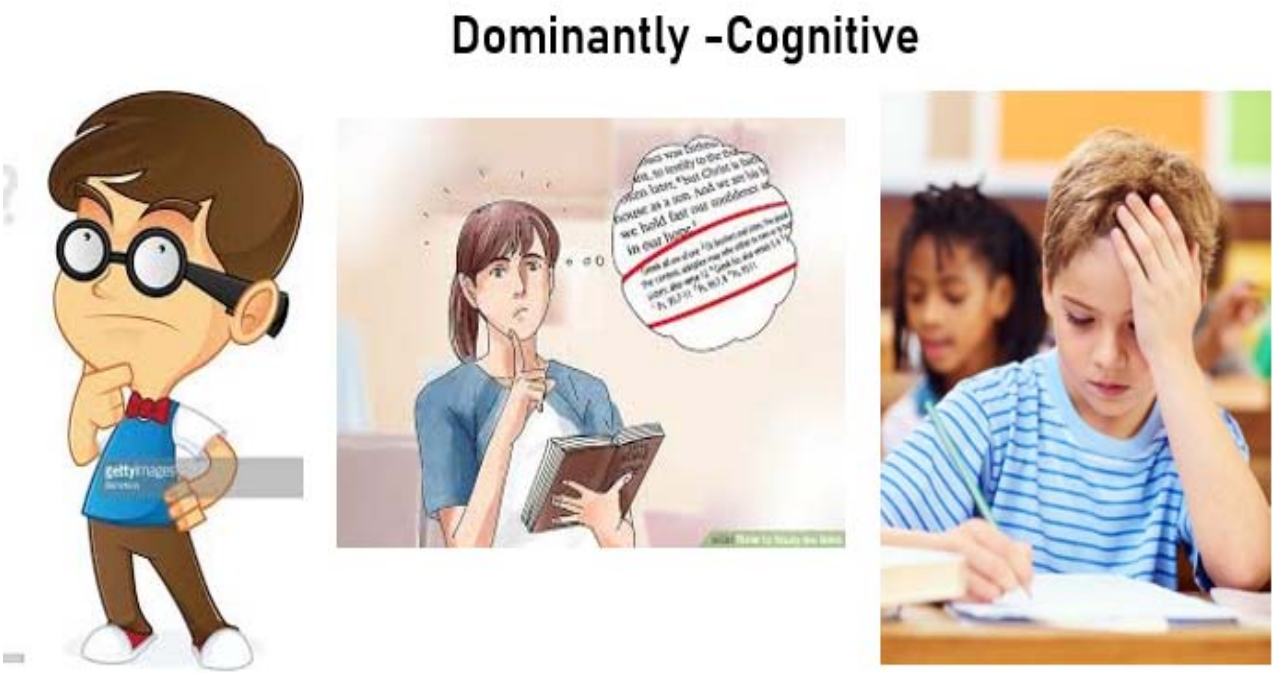
- ☐ Spiritual



Anderson-Bloom Taxonomy

- Bloom, B.S. (Ed.): The Taxonomy of Educational Objectives , The Classification of Educational
- Goals, Handbook 1: Cognitive Domain (1956). Popularly known as “The Handbook” !
- A major revision of Bloom’s taxonomy appeared in 2001. Anderson, Krathwohl et. al.: “A Taxonomy for Learning, Teaching and Assessment”
- The revised taxonomy is referred to as Anderson-Bloom Taxonomy

Cognitive Processes



Anderson/Bloom’s Taxonomy

- Remember
- Understand
- Apply
- Analyze
- Evaluate
- Create

Remember

- Remembering is retrieving relevant knowledge from long-term memory
- The relevant knowledge may be factual, conceptual, procedural, or some combination of these
- Remembering knowledge is essential for meaningful learning and problem solving
- Action verbs: Recognize, recall, list, tell, locate, write, find, mention, state, draw, label, define, name, describe, prove a theorem etc.

Sample Activities

- What percentage of Kerala state income comes from foreign remittances?
- What is the occupational structure of Kerala population?
- What is confessional poetry?
- Who gave the call "Swaraj is my birth right and I shall have it"?
- Identify the characters of Phylum Annelida with its classification

Sample Questions

- What happened after...?
- How many...?
- Who was it that...?
- Can you name the...?
- Describe what happened at...?
- Who spoke to...?
- What is the meaning of...?
- What is...?

Understand

- Understanding is constructing meaning from instructional messages
- Instructional messages can be verbal, pictorial/ graphic or symbolic
- Instructional messages are received during lectures, demonstrations, field trips, performances, or simulations, in books or on computer monitors

Understand: Sub-processes and Action Verbs

- Interpret: Translate, paraphrase, represent and clarify
- Exemplify: Illustrate and instantiate
- Classify: Categorize and subsume
- Summarize: Generalize and abstract
- Infer: Find a pattern
- Compare: Contrast, match and map
- Explain: Construct a model

Sample Activities

- Identify the characters of Phylum Annelida with its classification
- Compare the Indian Freedom Movement with other Asian And African Freedom Movements.
- Understand the agriculture commodity price fluctuations using Cobweb Theorem
- Illustrate the exclusion of marginalized population from the fruits of development
- Explain financial statement using fund flow and cash flow
- Estimate marginal utility from total utility
- Provide an example of . . .?
- What was the main idea expressed in . . . ?

Sample Questions

- Write in your own words...?
- Write a brief outline...?
- What do you think could happen next...?
- Who do you think...?
- What was the main idea...?
- Who was the key character...?
- Distinguish between...?
- What differences exist between...?
- Provide an example of what you mean...?

Apply

- Using procedures to perform exercises or solve problems
- Closely linked with procedural knowledge
- Execute/Implement: determine, calculate, compute, estimate, solve, draw, relate, modify, etc.

Sample Apply Activities

- Trace the historical background of American Literature
- Determine the correctness of English pronunciation over a range of recognized International accents.
- Compute the Energies and Wave functions of Hydrogen atom using Schrodinger equation.
- Prepare scripts for radio talks, news paper articles and television talks on health, nutrition and family living for tribal, rural and urban groups.
- Carry out the transcription of the given dialogue
- Compute trend from financial statements
- Do you know another instance where . . . ?

Analyze

Involves breaking material into its constituent parts and determining how the parts are related to one another and to an overall structure

- Differentiate: Discriminate, differentiate, focus and select (Distinguishing relevant parts or important parts from unimportant parts of presented material)
- Organize: Structure, integrate, find coherence, outline, and parse (Determine how elements fit or function within a structure)
- Attribute: Deconstruct (Determine a point of view, bias, values, or intent underlying presented material

Analyze Activities

- refining generalizations and avoiding oversimplifications
- developing one's perspective: creating or exploring beliefs, arguments, or theories
- clarifying issues, conclusions, or beliefs

- developing criteria for evaluation: clarifying values and standards
- evaluating the credibility of sources of information
- questioning deeply: raising and pursuing root or significant questions
- clarifying arguments, interpretations, beliefs, or theories
- reading critically: clarifying or critiquing texts
- examining or evaluating assumptions
- distinguishing relevant from irrelevant facts
- making plausible inferences, predictions, or interpretations
- giving reasons and evaluating evidence and alleged facts
- recognizing contradictions
- exploring implications and consequences

Samples of 'Analyze' activities

- Structure evidence into for and against a particular historical description
- Determine the point of the author of an essay in terms of his or her political perspective
- Identify the cause and effect of advertising in FMCG
- Analyze given literature from feminist and post-colonial approaches
- Identify the historical development of Sanskrit plays
- What is the theme . . . .?
- What evidence can you find . . .?
- What motive is there . . . ?
- How is , , , is related to . . . ?

Evaluate

☐ Make judgments based on criteria and standards

☐ Criteria used include quality, effectiveness, efficiency and consistency

☐ The standards may be either quantitative or qualitative

Evaluate: Action Verbs

- ☐ Check: Test, detect, monitor, coordinate
- ☐ Critique: Judge (Accuracy, adequacy, appropriateness, clarity, cohesiveness, completeness, consistency, correctness, credibility, organization, reasonableness, reasoning, relationships, reliability, significance, standards, usefulness, validity, values, worth, criteria, standards, and procedures)

Sample Evaluate Activities

- ☐ Select the factor among the following that has maximum impact on climate change
  - o Carbonated soft drinks like Pepsi and Coke
  - o Automobiles
  - o Cell phones o
  - Fast food
- ☐ What would you recommend . . .?
- ☐ What would you cite to defend the actions . . . ?
- ☐ What choice you would have made . . .?
- ☐ How would you rate the . . .?

Create

- ☐ Involves putting elements together to form a coherent or functional whole
- ☐ While it includes objectives that call for unique production, also refers to objectives calling for production that students can and will do

Action verbs:

- ☐ Generate: Classify systems, concepts, models, explanations, generalizations, hypotheses, predictions, principles, problems, questions, stories, theories)
- ☐ Plan (design)
- ☐ Produce

‘Create’ Samples

- ☐ Design a flowchart showing the energy flow in western ghats
- ☐ Create a plan to conserve wet land ecosystem
- ☐ Create awareness on issues related to health, nutrition and family using audio, visual and audio visual technologies.
- ☐ Design a marketing mix for fairness cream among working women in Tamilnadu during summer
- ☐ Produce a 30 minute movie out of a 2 hr feature film using the different techniques of editing

Higher Orders of Learning/ Deep Learning/Meaningful Learning

- ☐ Apply (Implement)
- ☐ Analyze
- ☐ Evaluate
- ☐ Create

Dominantly– Affective

Critical Thinking

- ☐ Critical thinking refers to the deep, intentional and structured thinking process that is aimed at analyzing and conceptualizing information, experiences, observation, and existing knowledge for the purpose of creating original and creative solutions for the challenges encountered

- ☐ Critical thinking is systematic and holistic in the sense that while examining a proposed solution, it examines its impact and consequences on other parts of the system thus ensuring that a solution at one level of the system does not create challenges and difficulties somewhere else

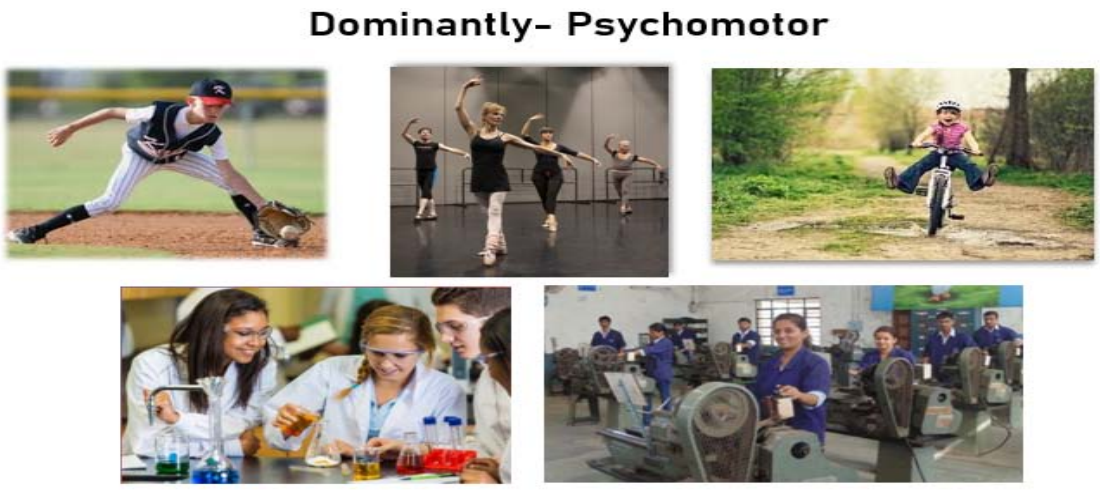
- ☐ Thinking critically requires a positive open and fair mindset that is able to objectively examine the available information and is aware of the laid assumptions and limitations brought about by them.
- ☐ Critical thinking is the art of analyzing and evaluating thinking with a view to improving it

Problem Solving

- ☐ Problem solving involves Apply, Analyze, Evaluate and Create processes One taxonomy of Problem Solving
- ☐ Routines (Apply)
- ☐ Diagnosis (Selecting a method: Apply and Analyse)
- ☐ Strategy (Order of using methods: Analyse and Evaluate)
- ☐ Interpretation (Multiple higher cognitive levels)
- ☐ Generation (Multiple higher cognitive levels)

Psychomotor Domain

- It includes physical movement, coordination, and use of the motor-skill areas. (Simpson, 1972)
- Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution.
- The psychomotor activities become important and even dominant in courses in programs in Theatre, Music, Painting, Sports, Medicine, Nursing, Dentistry, Emergency Medical Services etc.



Course Outcomes

General Programs

- ☐ Graduates of all UG and PG Programs in India are required to attain the Program Outcomes (POs) identified by the University/College and Program Specific Outcomes (PSOs) identified by the University or the Department offering the Program.

- ☐ POs and PSOs are to be attained through courses, projects, and co-curricular and extra-curricular activities in which performance of the students is evaluated.

Courses

- ☐ Courses are broadly classified into core courses, electives, ability enhancement courses and skill enhancement courses.
- ☐ POs and PSOs are to be attained through core courses, ability enhancement courses, and activities in which all students participate.
- ☐ Courses constitute the dominant part of any program.
- ☐ Under the present CBCS (Choice Based Credit System) the courses can be of 3:0:0, 3:0:1, 3:1:0. 4:0:0, 2:0:0, 2:0:1, 2:0:2, 0:0:1, 1:0:2 or 1:0:1credits.
- ☐ One Credit is defined as

    - ☐ One hour of classroom interaction per week over a semester

    - ☐ One hour of tutorial per week over a semester

    - ☐ Two hours of laboratory/field work per week over a semester

Students learn well when

- ☐ They are clear about what they should be able to do at the end of a course (Course Outcomes)

☐ Assessment is in alignment with what they are expected to do (Assessment in alignment with Course Outcomes)

☐ Instructional activities are designed and conducted to facilitate them to acquire what they are expected to achieve (Alignment between instruction and Assessment and Course Outcomes)

What are Course Outcomes?

☐ Course Outcomes (COs) are what the student should be able to do at the end of a course.

☐ It is an effective ability, including attributes, skills and knowledge to successfully carry out some activity which is totally identified.

☐ The most important aspect of a CO is that it should be measurable.

Structure of a CO Statement

☐ Will have a common stem: *Student should be able to*

☐ **Action:** Represents a cognitive/ affective/ psychomotor activity the learner should perform.An action is indicated by an action verb, occasionally two, representing the concerned **cognitive** process (s).

☐ **Knowledge**: Represents the specific knowledge from any one or more of the four knowledge categories

☐ **Condition**: Represents the process the learner is expected to follow or the condition underwhich to perform the action (This is an optional element of CO)

☐ **Criterion:** Represent the parameters that characterize the acceptability levels of performingthe action (This is an optional element of CO)

Two Action Verbs

- ☐ Sometimes it becomes equally important for a student to perform two cognitive processes on given knowledge elements. Only in such cases two action verbs are used in a CO statement.

- ☐ It is not an artefact to combine two COs into one.

Example

Prepare and explain financial statement using fund flow and cash flow.

(Preparation and explanation are equally important and both processes are related to the same knowledge elements fund flow and cash flow.)

Sample 1

Determine the slope from the given topographical map using Wentworth method. **Action**: Determine (Apply)

Knowledge: slope (Conceptual, Procedural)

Condition: given topographical map, Wentworth method

Criteria: None

Sample 2

Model a spring-mass system as a differential equation

Action: Model (Understand)

Knowledge: spring-mass system (Conceptual)

Condition: as a differential equation

Criteria: None

Sample 3

Understand the paradigm shifts in historical research.

Action: Understand (Understand)

Knowledge: paradigm shifts in historical research (Conceptual)

Condition: None

Criteria: None

Sample 4

Understand the concepts of Dhwani and Vakrokti

Action: Understand (Understand)
Knowledge: Dhwani, Vakrokti (Conceptual)
Condition: None
Criteria: None

A SMART CO is
S = Specific
One can tell what they should be able to achieve from reading the outcomes
M = Measurable
student is able to recognize when they have achieved the outcomes
A = Achievable
it is genuinely possible to complete the outcomes in the time, and with the resources available
R = Realistic
outcomes are appropriate for the student and the situation
T = Time bound
outcomes have a possible time limit for completion

Course Outcomes (Samples)

CO1: Understand aspects of human development including pregnancy, parturition, birth control, infertility, developmental defects and miscarriage.

CO2: Synthesize specified chemicals and characterize them, and interpret spectral data to elucidate the structure of synthesized chemical compound.

CO3: Write programs for one dimensional and two dimensional array manipulation and string handling functions

Program:B.Sc. Psychology

Name of Course: Foundations of Psychology

Credits: 4:0:0

CO	CO Statement
CO1	Understand the basic concepts in Psychology.
CO2	Understand the scientific terminologies in Psychology..
CO3	Develop the capacity to follow as well as comprehend advanced theories in the field.
CO4	Understand the different methods in Psychology
CO5	Understand the historical aspects of Psychology.
CO6	Evaluate the importance of sensation, attention and perception in daily life
CO7	Understand the major aspects of consciousness
CO8	Design an experimental study with control group.

Program:B.Sc. Polymer Chemistry

Name of Course: Polymer Chemistry I

Credits: 4:0:0

CO	CO Statement
CO1	Identify condensation polymer, addition polymer, carothers equation , thermosetting and thermo plastics
CO2	Define initiator, ceiling temperature, polymer degradation, photostabilisers
CO3	Explain Flory Huggins theory, theta solvent, gel point
CO4	Determine weight average molecular weight, number average molecular weight, polydispersity index
CO5	Derive the rate equation for coordination polymerisation, ionic and condensation polymerisations
CO6	Discuss the mechanisms of Zeigler Natta Polymerisation, Free radical polymerisation and ionic polymerization

Program: B.A. Political Science (Complementary course)

Name of Course: Introduction to Political Science

Credits: 2:0:0

CO	CO Statement
CO1	Understand the elementary knowledge about the meaning, origin, growth, importance & scope of Political science
CO2	Understand the important Political ideologies & major concepts liberalism, Marxism, Gandhism, & Democracy.

CO3	Understand Behavioural & Post-Behavioural approaches in the study of Political Science
CO4	Compare the functioning of Political System exists in U S A , U K, & India
CO5	Understand the relationship of Political science with History, Economics, Sociology, Psychology & Geography

Program: B.Sc.Physics

Name of Course: Basic Mechanics and Properties of Matter

Credits: 2:0:0

CO	**CO Statement**
CO1	Understand the equation of motion related to the rotation of different regular shaped rigid bodies and their moments of inertia about different axes.
CO2	Understand simple harmonic motion by the static force analysis of simple pendulum and compound pendulum and extend the concept to general mechanical waves & electromagnetic waves.
CO3	Understand elastic properties of materials, surface tension of fluids and fluid dynamics

Program: B.A. English Language and Literature

Name of Course: Reading Poetry

Credits: 4:0:0

CO	CO Statement
CO1	Define the forms and types of poetry
CO2	Explain the diverse poetic devices and strategies employed by poets
CO3	Discuss the historical background of the poets
CO4	Identify the figures of speech in the poems prescribed
CO5	Develop the level of literary and aesthetic experience
CO6	Determine the various characteristics of the different schools of poetry
CO7	Analyze poems critically with the skills gained from the critical analysis of poems of study

Name of Program: **B.A. Economics**

Name of Course: **Statistical Methods for Economics**

Credits: **3:0:0**

CO	CO Statement
CO1	Calculate Measures of Central Tendency and Dispersion.
CO2	Describe and Analyse Statistical Data
CO3	Interpret Correlation and Regression
CO4	Apply Probability Distributions to Various Economic Problems.

CO5	Demonstrate the Trend of Economic Variables over Time

Name of Program: BCA

Name of Course: Cloud computing

Credits: 3:1:0

CO	CO Statement
CO1	Understand the different architecture of Cloud Computing.
CO2	Understand the cloud application in industries- Amazon,Microsoft Azure,Google AppEngine .
CO3	Understand the economy of cloud computing and its open challenges.
CO4	Understand Scientific application of cloud computing.
CO5	Understand the underlying principle of cloud virtualization, cloud storage, data management and data visualization.
CO6	Explain the core issues of cloud computing such as security, privacy, and interoperability.
CO7	Explain the main concepts, key technologies, strengths, and limitations of cloud computing.
CO8	Analyze the Cloud computing setup with it's vulnerabilities and applications using different architectures

Program:B.Com.

Course: Fundamentals of Income Tax

Credits: 3:0:0

CO	CO Statement
CO1	Understand the basic concepts of income tax
CO2	Determine the residential status of an individual, HUF, Company and AOP/BOI.
CO3	Compute the income from salary of an individual
CO4	Compute the income from house property of an individual.
CO5	Compute profits and gains of business or profession.
CO6	Compute the income from capital gains of an individual.
CO7	Prepare the statement showing computation of income from other sources of an individual.
CO8	Describe the rules applicable in clubbing and aggregation of income.

Program: B.Sc. CHEMISTRY

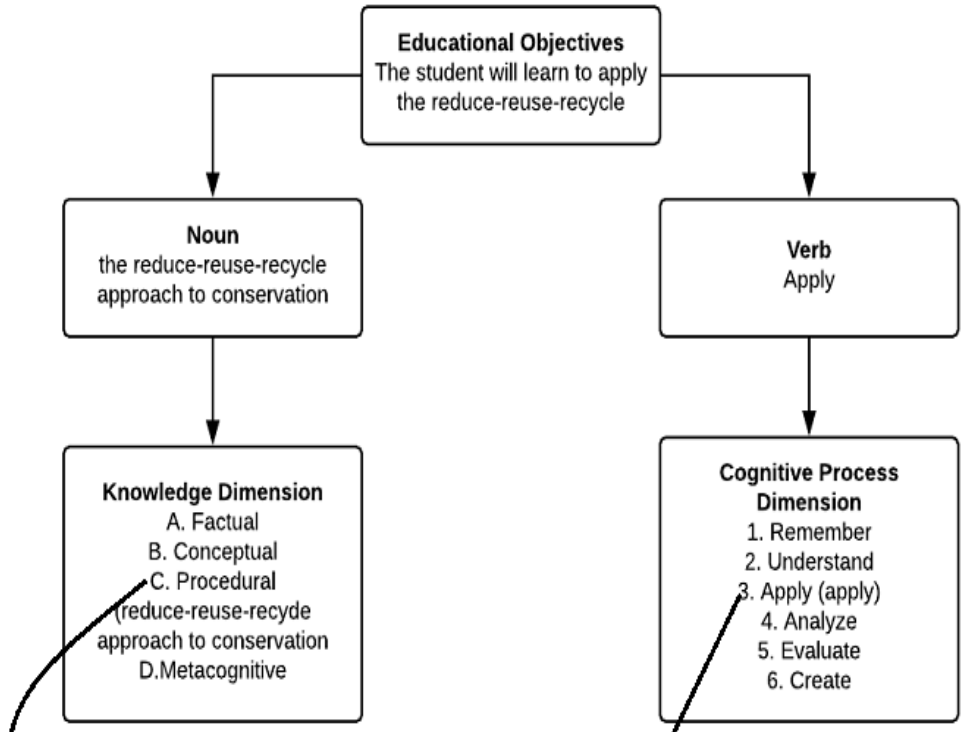
Course: Organic Chemistry I

Credits:4:0:0

CO	CO Statement
CO1	State asymmetry and dissymmetry

CO2	Understand the basic concepts of the structure of organic molecule.
CO3	Determine IUPAC name of organic molecules
CO4	Compare unimolecular and bimolecular nucleophilic substitution reactions
CO5	Analyze conformational and configurational structures of organic compounds
CO6	Apply Hoffmann rule and saytzeffs rules
CO7	Explain electron displacement effects
CO8	Identify the absolute and relative configurations of organic molecules

How an Objective (the student will learn to apply the reduce-reuse cycle approach to conservation) is classified in the taxonomy table



Knowledge Dimesnion	Cognitive Process Dimension					
	Remember	Understand	Apply	Analyse	Evaluate	Create
Factual						
Conceptual						
Procedural			X			
Metacognitive						

Action Verbs associated with Bloom's cognitive levels

Remember

- Recognize/Identify
- Recall/Retrieve: List, mention, state, draw, label, define, name, describe, prove a theorem tell, show, label, collect, examine, tabulate, quote, , who, when, where, etc.

define, describe, duplicate, enumerate, examine, identify, label, list, locate, match, memorize

name, observe, omit, quote, read, recall, recite, recognize, record, repeat, reproduce, retell, select state, tabulate, tell, visualize

Understand

- Interpret: Translate, paraphrase, represent, describe, express, extend and clarify
- Exemplify: Illustrate and instantiate
- Classify: Categorize and subsume
- Summarize: Generalize and abstract
- Infer: Extrapolate, interpolate, predict, conclude
- Compare: Contrast, match, map, distinguish and differentiate
- Explain: Illustrate, construct a model, confirm, state, write down, associate and discuss

Apply

- Execute: Determine, calculate, compute, estimate solve, use, draw, and carry out (a procedure in known situation)
- Implementing: Determine, calculate, compute, estimate solve, use draw, and carry out (a procedure in unfamiliar situation)

Analyze

- Differentiate: discriminate, select, focus and distinguish (between accurate and inaccurate, cause and effect, consistent and inconsistent, dominant and subordinate, essential and inessential, facts and conclusions, facts and hypotheses, facts and inferences, facts and opinions, facts and value statements, plausible and implausible, possible and impossible, relevant and irrelevant, summaries and conclusions, supportive and contradictory, valid and invalid, verifiable and unverifiable, warranted and unwarranted)
- Organize: Identify (adequacy, assumptions, attributes, biases, causes, central issues, completeness, concepts, consequences, contradictions, criteria, defects, distortions, effects, elements, errors, exceptions, fallacies, inconsistencies, inferences, limitations, main ideas, nature of evidence, organization, plausibility,

problems, procedures, reasoning, relationships, relevance, stereotypes, trends, validity, variables), structure, integrate, find coherence, outline and parse.

- Attribute: Deconstruct and ascertain (Assumptions, attitudes, biases, conditions, characteristics, motives, organization, points of view, purposes, qualities, relationships)

Evaluate

- Check/test (Accuracy, adequacy, appropriateness, clarity, cohesiveness, completeness, consistency, correctness, credibility, organization, reasonableness, reasoning, relationships, reliability, significance, usefulness, validity, values, worth), detect, monitor and coordinate.
- Critique/judge (Criteria, standards, and procedures)

Create

- Generate alternatives and hypotheses
- Plan/design
- Produce/construct
- Develop, devise, express, facilitate, formulate, generalize, hypothesize, infer, integrate, intervene, invent Prepare, produce, propose, revise, role-play, simulate, speculate, structure, test, validate, write,

Taxonomy of Learning: Knowledge Categories

Knowledge

☐ The problem of characterizing knowledge is an enduring question of philosophy and psychology

- ☐ Knowledge is organized and structured by the learner in line with a cognitivist-constructivist tradition.
- ☐ Knowledge is domain specific and contextualized.

Categories of Knowledge

General Categories

- ☐ Factual
- ☐ Conceptual
- ☐ Procedural
- ☐ Metacognitive

Factual Knowledge

- ☐ basic elements students must know if they are to be acquainted with the discipline or solve any of the problems in it
- ☐ exists at a relatively low level of abstraction
- ☐ *Knowledge of terminology* (e.g., words, numerals, signs, pictures)
- ☐ *Knowledge of specific details (including descriptive and prescriptive data) and elements*

Samples of Factual Knowledge

- ☐ **Terminology:** Demand, price, GDP, confessional poetry, transference, empathy, social phobia,
  counseling, confessional poetry, transference, empathy, social phobia, counseling, atman, dharma

Specific details:

- ☐ Worldwide human population density is around = 13.7 per km^2 (35 per sq. mile),
- ☐ Population density of India is 380/km^2.
- ☐ The sex ratio in Kerala is 1084 as per 2011 census
- ☐ More than 50% of people in Kerala live in rural area

Conceptual Knowledge

- ☐ A concept denotes all of the entities, phenomena, and/or relations in a given category or class by using definitions.
- ☐ Concepts are abstract in that they omit the differences of the things in their extension
- ☐ Classical concepts are universal in that they apply equally to every thing in their extension.
- ☐ Concepts are also the basic elements of propositions, much the same way a word is the basic semantic element of a sentence.

Conceptual Knowledge

includes

- ☐ knowledge of categories and classifications, and the relationships between and among them
- ☐ schemas, mental models, or implicit or explicit theories
- ☐ how a particular subject matter is organized and structured
- ☐ how the different parts or bits of information are interconnected and interrelated in a more systematic manner
- ☐ how these parts function together

Samples of Conceptual Knowledge

- ☐ Force, acceleration, velocity, mass, voltage, current, temperature, entropy, stress, strain
- ☐ Sustainable development, population ageing, inclusive growth, cropping pattern
- ☐ Theory of evolution
- ☐ Newton’s laws of motion

Procedural Knowledge

- ☐ is the “knowledge of how” to do something
- ☐ it often takes the form of a series or sequence of steps to be followed.
- ☐ includes knowledge of skills, algorithms, techniques, and methods, collectively known as procedures

- ☐ also includes knowledge of the criteria used to determine when to use various procedures.
- ☐ is specific or germane to particular subject matters or academic disciplines

Examples of Procedural Knowledge

- ☐ Solving ordinary linear differential equation
- ☐ Estimate the growth rate of elderly population
- ☐ Calculate the number of frames per second in a silent movie
- ☐ Perform aerobic exercises
- ☐ Write, edit, design and produce content related to sporting activity using IT tools
- ☐ Apply geospatial techniques to analyse spatial data
- ☐ Active listening
- ☐ Empathising

Metacognition

Metacognition is

- ☐ thinking about one’s own thinking

- ☐ the ability to assess our own skills, knowledge, or learning
- ☐ a person's awareness of his or her own level of knowledge and thought processes (Stephen Chew)

Metacognitive ability affects

- ☐ how well and how long students study
- ☐ how much and how deeply students learn

Aspects of Metacognition

- ☐ Reflection
  - o Knowledge
  - o Thinking
- ☐ Self-regulation
  - o managing how we go about learning

Reflection

☐ Students have thoughts, notions, and intuitions about their own knowledge and thinking. Types of Reflection (metacognitive knowledge) - Flavell (1979)

☐ Awareness of knowledge

☐ Awareness of thinking

☐ Awareness of thinking strategies

Metacognitive Regulation

Three ways we direct our own learning (Ann Brown et. al. 1983)

1. Planning approaches to tasks

☐ identifying the problem, choosing strategies

o How can I keep track of what I know?

o How do I decide which paths to go down?

o How long should I try this approach?

o When should I switch to another strategy? o What should I try next?

☐ organizing thoughts, and predicting outcomes

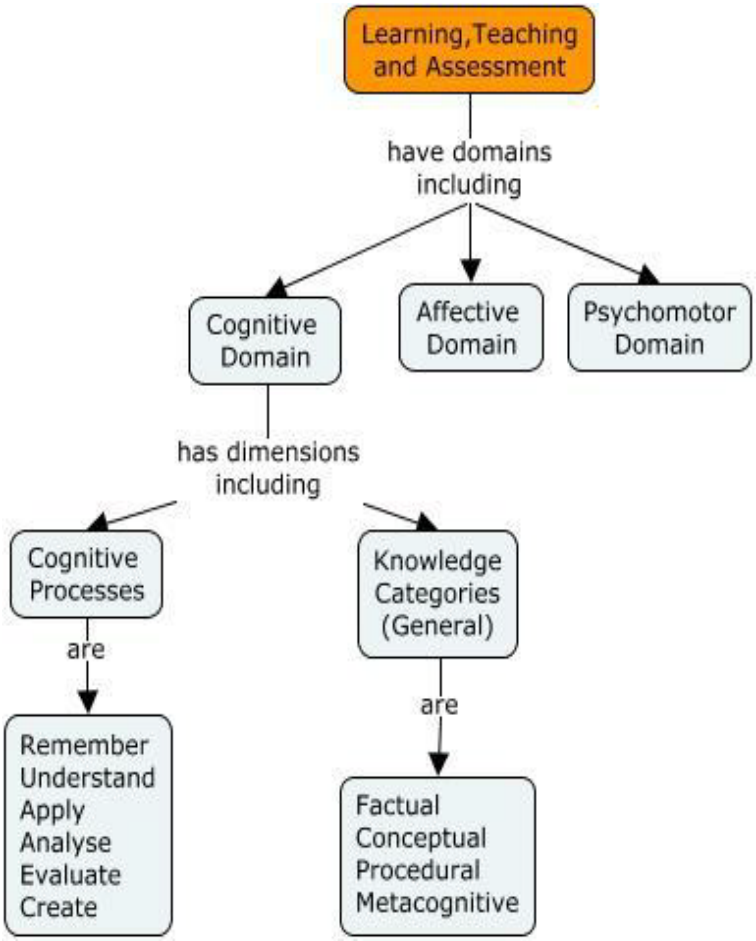
2. Monitoring activities during learning

☐ testing, revising, and evaluating the effectiveness of our strategies

3. Checking outcomes

☐ evaluating the outcomes against specific criteria of efficiency and effectiveness

Taxonomy of Cognitive Domain General



When learning

☐ You are not necessarily dealing with knowledge elements belonging to only one category. One may be dealing with

☐ Factual knowledge elements

☐ Factual, conceptual and metacognitive elements

- ☐ Factual, conceptual, procedural and metacognitive elements

While the learner is/can not directly dealing with metacognitive elements, the instructor has to deal with metacognitive elements in organizing and designing learning events.

Taxonomy Table

- ☐ It is a table of six cognitive processes (columns) and four categories of knowledge (rows).

- ☐ Each cell represents a specific combination of cognitive process and a category of knowledge.

Anderson-Bloom Taxonomy Table

Cognitive Process	**Knowledge Category**			
	Factual	Conceptual	Procedural	Metacognitive
Remember				
Understand				
Apply				
Analyse				
Evaluate				
Create				

Alignment

- ☐ Alignment refers to the correspondence of learning objectives, assessment and instructional activities

Psychomotor Domain

- ☐ It includes physical movement, coordination, and use of the motor-skill areas. (Simpson, 1972)

- ☐ Development of these skills requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution.

- ☐ The psychomotor activities become important and even dominant in courses in programs in Theatre, Music, Painting, Sports, Medicine, Nursing, Dentistry, Emergency Medical Services etc.

Pierce and Gray Taxonomy of PD

1. **Psychomotor Perceiving**
   - o Sensory Transmission
   - o Physio Functional Maintenance
2. **Activating**
   - ☐ Physical Outputs
   - ☐ Mimicry
   - ☐ Deliberate Modelling
3. **Executing**
   - ☐ Task Execution
   - ☐ Operational Execution
   - ☐ Skilled Execution
4. **Maneuverings**
   - ☐ Inspecting Skills
   - ☐ Selecting Skills
5. **Psychomotor Judging**
   Establishing Performance
   - ☐ Criteria
   - ☐ Performance Judging
6. **Psychomotor Creating**
   - ☐ Combining Skills
   - ☐ Performance Insight

Affective Domain

- Proposed in 1956 by Krothwohl, Bloom, and Masia (Pierce and Gray, 1981)

- is most commonly associated with feelings and emotions

- is usually displayed in the form of positive or negative reaction to given events, objects, behaviours, policies or situations

- affective behaviours are accompanied by varying degrees of feelings and reflect distinct

  “approach” or “avoidance” predispositions

- person’s past experience in interacting with environment shapes the nature and scope of affective responses

Emotion

- Emotion is the basic element of all the items of

  affect Recent findings indicate

- Thought, emotion and sensation work together to bring about human experience and understanding of the world

- Emotional experiences have cognitive aspects and intellectual pursuits have emotional overtones

Pierce-Gray Taxonomy of Affective Domain

1. Perceive

- ☐ Emotive Implanting
- ☐ Response Setting

2. React

- ☐ Emoting
- ☐ Recognizing
- ☐ Controlling

3. Conform

- ☐ Artificial Attitude
- ☐ Consistent Attitude
- ☐ Rationalized Attitude

4. Validate

- ☐ Examining Values
- ☐ Accepting Values

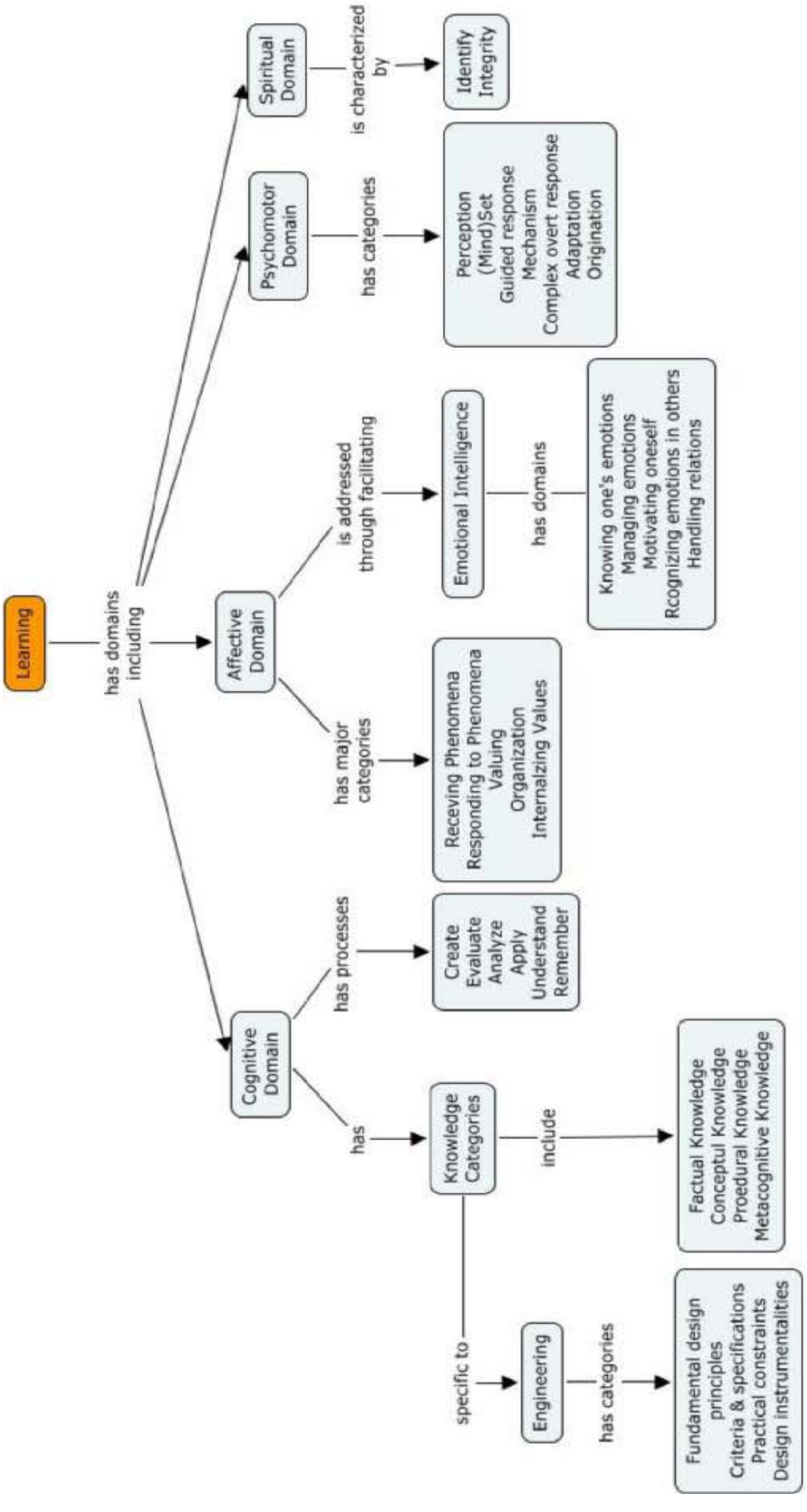
5. Affective Judge

Establishing Value

- ☐ Criteria
- ☐ Value Judging

6. Affective Create

- ☐ Integrating Values
- ☐ Inspirational Insight


Learning
has domains including
Affective Domain
is addressed through facilitating
Emotional Intelligence
has domains
Knowing one's emotions
Managing emotions
Motivating oneself
Rcognizing emotions in others
Handling relations
has major categories
Receving Phenomena
Responding to Phenomena
Valuing
Organization
Internalizing Values
Psychomotor Domain
has categories
Perception
(Mind)Set
Guided response
Mechanism
Complex overt response
Adaptation
Origination
Spiritual Domain
is characterized by
Identify
Integrity
Cognitive Domain
has processes
Create
Evaluate
Analyze
Apply
Understand
Remember
has
Knowledge Categories
include
Factual Knowledge
Conceptul Knowledge
Proedural Knowledge
Metacognitive Knowledge
specific to
Engineering
has categories
Fundamental design principles
Criteria & specifications
Practical constraints
Design instrumentalities

Sample 5

Estimate the test reliability using Cronbach's Alpha method, accurate up to two decimal places, from the given test results.

Action: Estimate (Apply)

Knowledge: Test Reliability (Conceptual and Procedural)

Condition: Cronbach's Alpha method, Given test results

Criteria: accurate up to two decimal places

Anderson-Bloom Taxonomy Table

Cognitive Process	**Knowledge Category**			
	Factual	Conceptual	Procedural	Metacognitive
Remember				
Understand		**CO3, CO4**		
Apply		CO1, CO2, CO5	CO1, CO2, CO5	
Analyse				
Evaluate				
Create				

☐ Too small a number of COs do not capture the course in sufficient detail and may not serve instruction design that very well.

- ☐ Too many COs make all the processes related to assessment design and computation of attainment of COs messy and demanding.

- ☐ A 3:0:0, 3:1:0 and 3:0:1 courses, should have about 6 course outcomes, and a five credit course about 8 course outcomes

- ☐ The number of COs of courses carrying different number of credits can be suitably adjusted.

Course Outcomes

- ☐ Attainment of course outcomes is measured through formative and summative assessment.

- ☐ It should be possible to determine the attainment of a CO through the normally followed assessment mechanisms without needing additional instruments.

- ☐ It is the practice of many Universities to present the syllabus of course as a set of Units to facilitate equal attention to all sections of the syllabus.

- ☐ There need not be one to one correspondence between Units of a course and the COs. AUnit can be addressed by more than one CO. A CO, if necessary, can address topics from more than one Unit.

Dos and Don’ts

- ☐ Use only one action verb (two if absolutely necessary).

- ☐ Do not use words including ‘like’, ‘various’, ‘such as’, ‘different’, ‘etc.’ with respect to knowledge elements. Enumerate all the knowledge elements.

- ☐ Put in effort to make the CO statement as detailed as possible and measurable.

☐ Do not make it either too abstract or too specific.

Check List

1. Does the CO begin with an action verb (e.g., state, define, explain, calculate, determine, identify, select, design)?

2. Is the CO stated in terms of student performance (rather than teacher performance or subject matter to be covered)?

3. Is the CO stated as a learning product (rather than in terms of the learning process)?

4. Is the CO stated at the proper level of generality and relatively independent of other COs (i.e., is it clear, concise, and readily definable)?

5. Is the CO attainable (do they take into account students' background, prerequisite competences, facilities, time available and so on)?

Errors in writing COs

☐ Students will undertake field visits

Instructional activities are designed to facilitate the attainment of COs by learners, but themselves are not COs

☐ Have the concepts of Continental Philosophy

COs are competencies / behaviors that can be demonstrated; not descriptions of internal changes in the students (though these are necessary)

☐ Sources of stress – social and cultural sources of stress

No action verb; no way of assessing; no way of determining attainment level; syllabus part is rewritten.

☐Apply problem solving techniques to find solutions to problems. Too general; no clear way of assessing

☐ To continue the study of advancement in Linguistics

It has nothing to do with any learning activity related to the course.

☐ Study a variety of advanced image compression techniques

Activity that the student engages in during the Course; not what he / she becomes capable of demonstrating at the end of the course?

☐ Have practical experience of developing applications that utilize Standard Packages like

QGIS

This describes a nonspecific learning activity and not a learning product that can be measured.

☐Have a total understanding of Sanskrit language from the linguistic point of view. Not an action that can be demonstrated; Internal change; Not realistic?

☐ Introduce the concepts, theory and logic behind computational linguistics and its application in society.

Teacher centric!

☐ Have a appreciation for the scope, complexity and requirement to treat the subject as the need of the hour and to have a positive attitude to earth environment and its protection. Appreciation and positive attitude are internal changes and not directly measurable

Exercise

☐ Write course outcomes of a course you taught or are familiar with paying attention to all the Do's and Don'ts, making sure all the items in check list are checked out.

Tagging the Course Outcomes

Tagging COs with Classroom Sessions

☐ Many Universities describe the syllabi of their courses in terms of 5, 6 or more Units.

☐ All Units are associated with the same number of classroom sessions.

☐ If one CO is associated with one Unit all COs are required to have the same number of classroom sessions.

☐ Autonomous Institutions are not required to follow the Unit structure, and may have the number of COs as decided by the subject and the teacher.

☐ Different COs may have different number of classroom sessions.

Tagging COs with Cognitive Levels

☐ As stated earlier a CO statement starts with an action verb from one of the cognitive levels, and occasionally by two action verbs from two cognitive levels.

☐ The action verb enables you to tag a CO with the Cognitive Level. Use the acronyms R-Remember, U-Understand, Ap- Apply, An-Analyse, E-Evaluate and C-Create.

- ☐ As there are no sharp demarcation lines between some cognitive levels, there is a possibility of one Action Verb representing two different cognitive levels. Use judgment in such cases.

Tagging COs with Knowledge Categories

- ☐ As mentioned earlier a CO statement will include one or more categories of knowledge.

- ☐ CO statement itself may not explicitly indicate all the concerned knowledge categories. Some knowledge categories may be implicitly addressed. The instructor needs to decide these categories based on the proposed design of instruction and assessment.

Tagging COs with PSOs

- ☐ If the PSOs are written well there should not be any ambiguity regarding the PSO addressed by the course under consideration.

- ☐ All the COs of a course will address the same PSO(s).

Tagging COs with POs

- ☐ Majority of the courses as they are offered at present, particularly in non-autonomous institutions, do not address many POs.

- ☐ There may be some specific courses that address certain POs like Sustainability, Environment, Communication etc.

- ☐ Projects can potentially address many POs. But the POs addressed must get reflected in the rubrics used.

☐ Tagging a CO with any PO requires that the assessment includes items related to the identified PO.

☐ A CO of a course can potentially address a large number of POs. However, it may not possible to conduct instruction and assessment within the available time and resources to address all the identified POs.

☐ Assessment items, related to some POs cannot be easily designed, and even if designed cannot be used in centrally conducted and evaluated examinations.

☐ A Department can arrange for some activities outside the curriculum to address some POs. However, the scope and distribution of these activities need to be carefully planned by the Department.

Attainment of Outcomes

Course Outcomes

☐ Course Outcomes are statements on what the students will be expected to attain at the end of the course.

☐ The number of course outcomes is about 6.

☐ 2-credit course has about 28 classroom sessions

☐ 3-credit course has about 40 classroom sessions

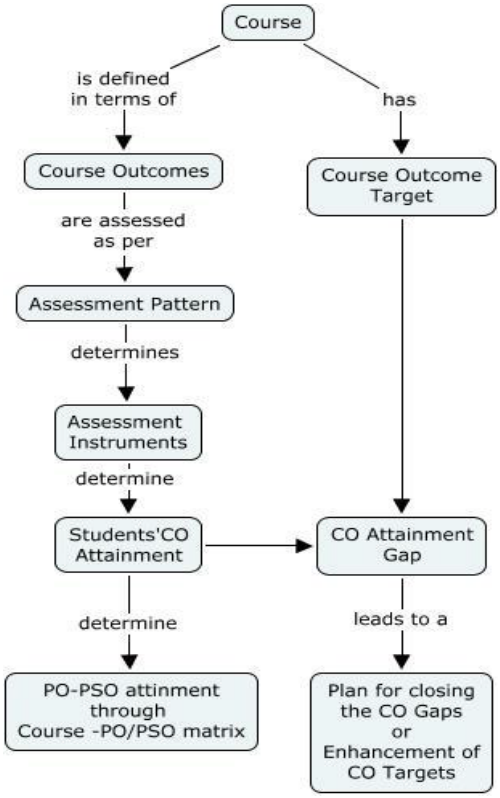
☐ 4-credit course has about 54 classroom sessions

☐ It is desirable to associate an approximate number of classroom sessions with each Course Outcome.

Course: Developmental Biology

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions
CO1	Understand the structural and functional features of human reproductive system.	PO1, PSO3	U	C	5
CO2	Understand the type of eggs based on the amount, distribution and position of yolk	PO1, PO5, PSO3	U	C	6
CO3	Compare the early developmental process of egg up to gastrula stage	PO1, PO3, PSO3	U	C	6
CO4	Illustrate the development of 18 hr, 24 hr, 33 hr, and 48 hr chick embryo and development of extraembryonic membranes	PO3, PSO3	U	C	4
CO5	Understand aspects of human development including pregnancy, parturition, birth control, infertility, developmental defects and miscarriage	PO3, PO5, PSO3	U	C	8
CO6	Describe the prenatal diagnostic techniques.	PO1, PO3, PSO3	U	F	3
CO7	Explain the scope of IVF, embryo transfer and stem cell research, and the ethical values involved in their practice.	PO3, PSO3	U	C	5
CO8	Enumerate the different types of placenta and its functions in mammals.	PO1, PSO3 PO1, PO5, PSO3	U U	C C	3 5
CO9	Understand the mechanism of embryonic cell differentiation and gene action leading to differential potency of cells				
	Total Hours of instruction				45

CO Attainment



Attainment of COs of the Course

☐ Attainment of COs can be measured **directly** and **indirectly**

☐ Direct attainment of COs can be determined from the performances of students in all the relevant assessment instruments.

☐ Indirect attainment of COs can be determined from the course exit surveys.

☐ The exit survey form should permit receiving feedback from students on individual COs.

- ☐ Computation of indirect attainment of COs may turn out to be complex; the percentage weightage to indirect attainment can be kept at a low percentage, say 10%.

Direct CO Attainment

- ☐ Semester End Examination (SEE) is conducted and evaluated by the University/Autonomous College.

- ☐ The Department will have access to all he marks obtained by each student in the course

- ☐ The proportional weightages of CIE: SEE may be 25:75; 40:60; 50:50.

- ☐ The number of assessment instruments used for CIE is decided by the instructor and/or Department

Assessment Pattern

All assessment items in all CIE assessment instruments are to be tagged with

- ☐ Cognitive Level (CL)

- ☐ Course Outcome (CO)

- ☐ Marks.

Sample Assessment Pattern for all the concerned CIE Instruments (assuming 25% weightage for CIE) indicated.

CL	A1	T1	T2
Remember		30%	30%
Understand	100%	70%	70%
Apply			
Analyze			
Evaluate			
Create			

CIE Class Average

CO	A1 5 Class Average	T1 5 Class Average	T2	CIE Class Average
CO1	0	1.6/2	0	1.6/2=80%
CO2	0	1.7/2	0	1.7/2=85%
CO3	0	2.25/3	0	2.25/3=75%
CO4	1.5/3	2/3	0	3.5/6=70%
CO5	1.8/2	0	1.2/2	3/4=75%
CO6	0	0	1.4/2	1.4/2=70%
CO7	0	0	1.6/2	1.6/2=80%
CO8	0	0	1.3/2	1.3/2=65%
CO9	0	0	1.3/2	1.3/2=65%

Setting CO Attainment Targets

There can be several methods

Example 1:

☐ Same target is identified for all the COs of a course.

☐ For example the target can be “the class average marks ≥ 60 marks**”**

Example 2

☐ Targets are the same for all COs and are set in terms of performance levels of different groups of students.

☐ While this method classifies students into different categories it does not provide any clues to plans for improvement of quality of learning

Targets			
(% of students getting <50)	(% of students getting >50 and <50)	(% of students getting >65 and < 80)	(% of students getting > 80)
10	40	30	10

Example 3

☐ Targets are set for each CO of a course and for different groups of students separately

☐ Provides considerable details which can lead to specific plans for improvement

CO	**Targets**			
	(% of students getting <50)	(% of students getting ≥ >50 and < 65)	(% of students getting ≥ >65 and < 80)	(% of students getting ≥ 80)
CO1	10	40	40	10
CO2	20	30	40	10
CO3	20	30	40	10
CO4	10	40	40	10
CO5	20	20	50	10
CO6	20	20	50	10

Setting targets for Course Outcomes

Example 4

- Targets are set for each CO of a course separately.

  It does not directly indicate the distribution of performance among the students. It has the advantage of finding out the difficulty of specific COs

- There are several ways setting targets for Course Outcomes

CO	Target (Class Average)
CO1	55
CO2	60
CO3	65
CO4	50
CO5	65
CO6	65
CO7	75
CO8	70
CO9	70

Computation of CO Direct Attainment in the course Cxxx

Attainment of COi in a course Cxxx = Wt. of CIE x Attainment of COi as percentage in CIE + Wt. of SEE x Class Average Marks Percentage in SEE

CO	CIE Cl. Ave	SEE Cl. Ave	Direct CO Attainment 0.25 CIE Cl. Ave +0.75 SEE Cl. Ave
CO1	80	**55**	61.25
CO2	85	55	62.5
CO3	75	55	60

CO4	70	55	58.75
CO5	75	55	60
CO6	70	55	58.75
CO7	80	55	61.25
CO8	65	55	
CO9	65	55	57.5

CO Attainment and Attainment Gap

☐ Computation of Attainment of COs in Cxxx = 0.9 Direct CO Attainment+ 0.1 Indirect CO Attainment

CO	**Direct CO Attainment 0.25 CIE Cl. Ave +0.75 SEE Cl. Ave**	**Indirect CO Attainment (Exit Survey)**	**CO Attainment**	**CO Target**	**CO Attainment Gap %ge**
CO1	61.25	75	62.63	55	-7.63
CO2	62.5	70	63.25	60	-3.25
CO3	60	75	61.50	65	3.5
CO4	58.75	70	59.88	50	-9.88
CO5	60	75	61.50	65	3.5
CO6	58.75	75	60.38	65	4.62
CO7	61.25	75	62.63	75	12.47
CO8	57.5	70	58.75	70	11.25
CO9	57.5	70	58.75	70	11.25

Note: When there are no attainment gaps or attainment gaps are negative it is expected that the instructor will enhance the CO target next time he offers the course.

Closure of the Quality Loop

CO	CO Target	CO Attainment Gap %ge	Plan for Closing the Gap	Enhancement of the Target
CO1	55	-7.63		To 65%
CO2	60	-3.25		To 65%
CO3	65	3.5	Present more visual material	
CO4	50	-9.88		To 65%
CO5	65	3.5	Organise group discussions	
CO6	**65**	**4.62**	Show videos	
CO7	75	12.47	Present Video materials Organise Discussions on involved ethical issues	
CO8	70	11.25	Present multi-media material	
CO9	70	11.25	Present Multi-media material Organise Group Discussions	

POs and PSOs from COs

☐ POs and PSOs are attained through program specific Core Courses.

☐ Each Course addresses a sub-set of POs and PSOs to varying levels (strengths) (1, 2 or 3).

☐ Sometimes we determine the POs/PSOs the courses address.

☐ Sometimes we may apriori determine the POs/ PSOs a Course should address and the COs have to be written to meet the identified POs/PSOs.

Strength of CO-PO/PSO Mapping

- Attainment of a PO/PSO depends both on the attainment levels of associated COs and the strength to which it is mapped

- It is necessary to determine the level (mapping strength) at which a particular PO/PSO is addressed by the course.

- Strength of mapping is defined at three levels: Low (1), Medium (2) and Strong (3)

- Several methods can be worked to determine the strength of a PO/PSO, but implementing them across a few hundred courses can become a burden

Strength of CO-PO/PSO Mapping Sample

A simple method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

- If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

- If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

- If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

- If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed

Course – PO/PSO Mapping Strength

28 of 45 (62%) sessions are devoted to PO1	Mapping strength is 3
31 of 45 (69%) sessions are devoted to PO3	Mapping strength is 3
19 of 45 (42%) sessions are devoted to PO5	Mapping strength is 3
45 of 45 (100%) Sessions are devoted to PSO3	Mapping strength is 3

Course-POs/PSO Mapping

☐ POs and PSOs are addressed through core courses, projects etc.

☐ A course/project etc. meets a subset of POs and PSOs to different strengths (1, 2 or 3)

Sample Course addresses a subset of POs and PSOs to varying strengths

Course	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
C302	3	0	3	0	3	0	0	3

CO Attainment and POs/PSOs

☐ Not every COi of the course will address every PO or PSO addressed by the course

CO	POs	CO Attainment %ge
CO1	PO1, PSO3	62.63
CO2	PO1, PO5, PSO3	63.25
CO3	PO1, PO3, PSO3	61.50
CO4	PO3, PSO3	59.88
CO5	PO3, PO5, PSO3	61.50
CO6	PO1, PO3, PSO3	60.38
CO7	PO3, PSO3	62.63
CO8	PO1, PSO3	58.75
CO9	PO1, PO5, PSO3	58.75

PO and PSO Attainment

☐ PO and PSO attainments are normalized to 1, that is, if a PO is to be addressed at the level of 3 and attainments of CO associated with that PO is 100%, then attainment of that PO is 1

Attainment of PO1	(3/3) x Ave (0.626+0.632+0.615+0.604+0.587+0.587)	0.608
Attainment of PO3	(3/3)x Ave (0.615+0.599+0.615+0.604+0.626)	0.612
Attainment of PO5	(3/3) x Ave (0.632+0.615+0.587)	0.611
Attainment of PSO3	(3/3) x Ave (0.626+0.632+0.615+0599+0.615+0.604+0.626+0.587+0.587)	0.610

These computations are approximate but indicative of PO/PSO attainment.

Attainment of POs and PSOs

Course	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**
C302	3	0	3	0	3	0	0	3
Attainment	0.608	0	0.612	0	0.611	0	0	0.610

- Repeat this computation with every core course, seminars, projects, and other academic activities relevant to the attainment of POs / PSOs
- So we get a matrix such as the following:

Course	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
C101	0.226	0.329	0.848	0.248	0.148	0	0.758	0
…..								
C302	0.265	0.226	0.648	0.648	0.648	0	0.653	0
….. C806 (Project)	0.865	0.826	0.948	0.748	0.848	0.843	0.853	0.789

☐ For a given PO or PSO, determine the average attainment based on all the elements contributing to the attainment of that PO / PSO (Examine the column!). This is the Direct Attainment. (What should be the denominator?)

Course	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
C101	0.226	0.329	0.848	0.248	0.148	0	0.758	0
…..								
C302	0.265	0.226	0.648	0.648	0.648	0	0.653	0
……								
C806(Project)	0.865	0.826	0.948	0.748	0.848	0.843	0.853	0.789
Average Attainment	0.71	0.655	0.814	0.656	0.745	0.624	0.765	0.824

- ☐ Determine the Indirect Attainment based on all the relevant Surveys.
- ☐ (Graduate Exit Survey, Alumni Survey, Employer Survey)
- ☐ Combine them using suitable weights (typical 0.8 and 0.2)

Example: PO3

Direct Attainment based on all relevant academic activities: 65.5 %

Indirect Attainment based on all relevant surveys: 85.5 %

Combining them, attainment of PO3, for this batch of students is:

- ☐ (0.8 x 65.5) + (0.2 x 85.5) = 69.5 %
- ☐ Repeat this for all POs and PSOs
- ☐ Set targets for each PO and PSO
- ☐ Close the quality loop for each PO and PSO
- ☐ Attainment < Target then Plan improvement actions
- ☐ Attainment >= Target then Revise the target

Example: PO2

Combined

Attainment: 69.5

Target: 75%

Attainment Gap: 5.5

% Improvement

Action Plan:

- ☐ Add an extra communications lab in the third semester as a value-added core course
- ☐ Introduce a seminar starting from third semester
- ☐ Add in the 4th Semester, a 5-day workshop on communication skill
- ☐ ----------