INTEGRAL UNIVERSITY LUCKNOW

B.TECH - COMPUTER SCIENCE AND ENGINEERING PROGRAM EDUCATIONAL OBJECTIVES AND OUTCOMES

1. EDUCATIONAL OBJECTIVES, OUTCOMES AND ASSESSMENT CRITERIA

The educational aim of a course are statements of the broad intentions of the teaching team. They indicate what it is the teaching team intends to cover and the learning opportunities they intend to make available to the student.

A learning outcome is a an indicator of what a learner (student) is expected to know, understand and/or be able to do at the end of the learning period. It is advisable to express learning outcomes with the common prefix:

'On completion of (the period of learning of a course), the student is expected to be able to…'

Generally, learning outcomes do not specify curriculum, but more general areas of learning. It is not possible to prescribe precisely how specific a learning outcome statement should be. There is a balance to be struck between the degree of specificity in a learning outcome statement and that achieved by the assessment criteria (below).

If there are too many learning outcomes for a program, then either they are becoming assessment criteria or they are specifying too much curricular detail. The curriculum should be described in the range statement. Too few learning outcomes are unlikely to provide sufficient information on the program.

2. B. Tech-COMPUTER SCIENCE AND ENGINEERING PROGRAM OBJECTIVES

Program Objective - I

To prepare students for successful careers in industry that meet the needs of Indian and multinational companies

Program Objective - II

To develop ability among students to synthesize data and technical concepts for application to Software design.

Program Objective - III

To provide opportunity for students to work as part of teams on multidisciplinary projects.

Program Objective - IV

To provide students with a sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems and to prepare them for graduate studies.

Program Objective - V

To promote students' awareness of the life-long learning and to introduce them to professional ethics and codes of professional practice.

Program Objective - VI

To provide in depth knowledge of subjects so that they can participate and succeed in national and International challenges in the field of computer science and engineering

These objectives are very broad in purpose and intent, as Computer Science and Engineering students may seek further education or work in diverse areas. To make these objectives meaningful, they may be demonstrated by performance, actions, or achievements.

1. To prepare students for successful careers in industry that meet the needs of Indian and multinational companies

- ✓ Acceptance by and satisfactory progress in a graduate degree program
- ✓ Significantly contributing to delivery of desired component, product, or process
- ✓ Formulating and solving moderately complex computer engineering problems, accounting for hardware/software/human interactions
- ✓ Skillfully using state-of-the-art tools.
- ✓ Leading a project or design team

2. To develop ability among students to synthesize data and technical concepts for application to Software design.

- ✓ Learning a new skill, tool, area, or system on your own
- ✓ Formulating and solving moderately complex computer engineering problems, accounting for hardware/software/human interactions
- ✓ Skillfully using state-of-the-art tools for computer engineering processes

3. To provide opportunity for students to work as part of teams on multidisciplinary projects.

- ✓ Communicating effectively in a group environment
- ✓ Being asked to make presentations or reports for internal colleagues or clients
- ✓ Making appropriate decisions on when to outsource, when to use off-the-shelf components, and when to develop components in-house.
- ✓ Leading a project or design team
- ✓ Effectively resolving problems encountered in team work
- ✓ Estimating correctly the required resources (time, team, equipment, etc.) for computer engineering projects

4. To provide students with a sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems and to prepare them for graduate studies.

- ✓ Basic sciences and Mathematics subjects in the beginning of the course.
- ✓ Hand on practical experience in the labs with latest Engineering tools and techniques.
- ✓ Projects and summer training for gaining real life experience of the industry
- ✓ Guidance by experts for preparing and clearing national level exams such as GATE/JRF/NET.

5. To promote student awareness of the life-long learning and to introduce them to professional ethics and codes of professional practice.

- ✓ Publishing refereed paper in conference or journal, or producing an internally reviewed publication
- ✓ Participating in the field through public speaking, activity in professional societies, technical associations, standards boards, etc.
- ✓ Reading technical books, journals, conference papers, technical reports, or standards
- ✓ Attending a technical conference, symposium, or workshop
- ✓ Belonging to a professional society.
- ✓ Properly handling a situation involving intellectual property rights

6. To provide in depth knowledge of subjects so that they can participate and succeed in national and International challenges in the field of computer science and engineering

- ✓ Using advance design tools
- ✓ Practically applying the theoretical concepts
- ✓ Learning a new skill, tool, area, or system on your own

- ✓ Associating with national and international technical bodies
- ✓ Skillfully using tools for project and configuration management, e.g., resource planning systems, software source control systems, etc.

3. B. Tech - COMPUTER SCIENCE AND ENGINEERING PROGRAM OUTCOMES

(a) Students will demonstrate basic knowledge in Computer Science, Basic Science and Engineering discipline.

(b) Students will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results.

(c) Students will demonstrate the ability to develop web based and windows based software or a process that meets desired specifications and requirements.

(d) Students will demonstrate the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams.

(e) Students will demonstrate the ability to identify, formulate and solve Computer science related problems such as computational engineering problems.

(f) Students will demonstrate an understanding of their professional and Ethical responsibilities.

(g) Students will be able to communicate effectively in both verbal and written forms.

(h) Students will have the confidence to apply engineering solutions in global and societal contexts.

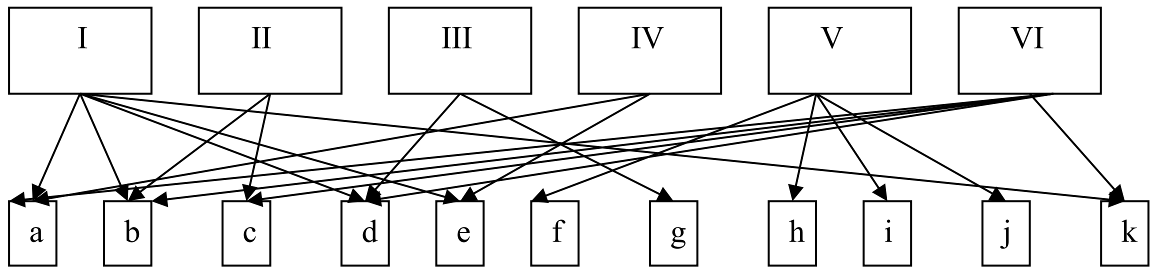
(i) Students will be capable of self-education and clearly understand the value of lifelong learning.

(j) Students will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.

(k) Students will be familiar with modern engineering software tools and equipment to analyze computer science engineering related problems.

4. MAPPING OF OBJECTIVES TO OUTCOMES

The following figures depicts the correlation between PEOs and POs



S.No.	Objectives	Outcomes
I	To prepare students for successful careers in industry that meet the needs of Indian and multinational companies	a. students will demonstrate basic knowledge in Computer Science, Basic Science and Engineering discipline. b. students will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results. d. students will demonstrate the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams. e. students will demonstrate the ability to identify, formulate and solve Computer science related problems such as computational engineering problems. k. students will demonstrate the ability to identify, formulate and solve Computer science related problems such as computational engineering problems.
II	To develop the ability among students to synthesize data and technical	b. students will demonstrate the ability to design and conduct experiments, interpret and

	Concepts for application to Software design	analyze data, and report results. c. students will demonstrate the ability to develop web based and windows based software or a process that meets desired specifications and requirements.
III	To provide opportunity for students to work as part of teams on Multidisciplinary projects.	d. students will demonstrate the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams. g. students will be able to communicate effectively in both verbal and written forms
IV	To provide students with a sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problems and to prepare them for graduate studies.	a. students will demonstrate basic knowledge in Computer Science, Basic Science and Engineering discipline. e. students will demonstrate the ability to identify, formulate and solve Computer science related problems such as computational engineering problems
V	To promote student awareness of the life-long learning and to introduce them to professional ethics and codes of professional practice.	f. students will demonstrate an understanding of their professional and Ethical responsibilities. h. students will have the confidence to apply engineering solutions in global and societal contexts. i. students should be capable of self-education and clearly understand the value of lifelong learning. j. students will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.

VI	To provide the in depth knowledge of subjects so that they can participate and succeed in national and International challenges in the field of computer science and engg.	a. students will demonstrate basic knowledge in Computer Science, Basic Science and Engineering discipline. b. students will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results. c. students will demonstrate the ability to develop web based and windows based software or a process that meets desired specifications and requirements. d. students will demonstrate the ability to function on engineering and science laboratory teams, as well as on multidisciplinary design teams. k. students will be familiar with modern engineering software tools and equipment to analyze computer science engineering related problems.

5. SPECIFIC LEARNING OUTCOMES IN ENGINEERING

Graduates from accredited programmes must achieve the following learning outcomes, defined by broad areas of learning.

(a) An ability to apply knowledge of computing, mathematical foundations, algorithmic principles, and computer science and engineering theory in the modelling and design of computer-based systems to real-world problems (fundamental engineering analysis skills).

- ✓ Knowledge and understanding of scientific principles and methodology necessary to strengthen their education in their engineering discipline, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies;
- ✓ Knowledge and understanding of mathematical principles necessary to underpin their education in their engineering discipline and to enable them to apply mathematical problems;
- ✓ Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data (information retrieval skills).

Practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. This can include:

- ✓ Knowledge of characteristics of particular materials, equipment, processes, or product; Workshop and laboratory skills;
- ✓ Understanding of contexts in which engineering knowledge can be applied (example, operations and management, technology development, etc.);
- ✓ Understanding use of technical literature and other information sources Awareness of nature of intellectual property and contractual issues;
- ✓ Understanding of appropriate codes of practice and industry standards;
- ✓ Awareness of quality issues;
- ✓ Ability to work with technical uncertainty.
- ✓ Understanding of engineering principles and the ability to apply them to analyse key engineering processes;
- ✓ Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modeling techniques;
- ✓ Ability to apply quantitative methods and computer software relevant to their engineering discipline, in order to solve engineering problems;
- ✓ Understanding of and ability to apply a systems approach to engineering problems.

(c) An ability to design , implement, and evaluate a computer-based system, process, component, or program to meet desired needs, within realistic constraints such as economic, environmental, social, political, health and safety, manufacturability, and sustainability (Creative Skills).

Design is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real problems. Graduates will therefore need the knowledge, understanding and skills to:

- ✓ Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues;
- ✓ Understand customer and user needs and the importance of considerations such as aesthetics;
- ✓ Identify and manage cost drivers;
- ✓ Use creativity to establish innovative solutions;
- ✓ fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal;
- ✓ Manage the design process and evaluate outcomes.
- ✓ Knowledge and understanding of commercial and economic context of engineering processes;
- ✓ Knowledge of management techniques which may be used to achieve engineering objectives within that context;
- ✓ Understanding of the requirement for engineering activities to promote sustainable development;
- ✓ Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk)

issues;

(d) An ability to function effectively on multi-disciplinary teams (team work).

- ✓ Independence
- ✓ Maturity – requiring only the achievement of goals to drive their performance
- ✓ Self-direction (take a vaguely defined problem and systematically work to resolution)
- ✓ Teams are used during the classroom periods, in the hands-on labs, and in the design projects.
- ✓ Some teams change for eight-week industry oriented Mini-Project, and for the seventeen - week design project.
- ✓ Instruction on effective teamwork and project management is provided along with an appropriate textbook for reference.
- ✓ Teamwork is important not only for helping the students know their classmates but also in completing assignments.
- ✓ Students also are responsible for evaluating each other's performance, which is then reflected in the final grade.
- ✓ Subjective evidence from senior students shows that the friendships and teamwork extends into the Junior years, and for some of those students, the friendships continue into the workplace after graduation.
- ✓ Ability to work with all levels of people in an organization
- ✓ Ability to get along with others
- ✓ Demonstrated ability to work well with a team

(e) An ability to analyze a problem, identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution (engineering problem solving skills)

Is based on the problem solving process that has been well documented in engineering texts. The elements of the process include:

- ✓ Problem or opportunity identification
- ✓ Problem statement and system definition
- ✓ Problem formulation and abstraction
- ✓ Information and data collection
- ✓ Model translation
- ✓ Validation
- ✓ Experimental design
- ✓ Solution development or experimentation
- ✓ Interpretation of results
- ✓ Implementation and documentation

As the most engineers eventually learn, the problem solving process is never complete. Therefore, a final element here is feedback and improvement.

(f) An understanding of professional, ethical, legal, security and social issues and responsibilities (professional integrity).

Comprises four components: ability to make informed ethical choices, knowledge of professional codes of ethics, evaluates the ethical dimensions of professional practice, and demonstrates ethical behavior.

- ✓ Stood up for what they believed in
- ✓ High degree of trust and integrity

(g) An ability to communicate effectively, both in writing and orally (speaking / writing skills).

Written Communication: "Students should demonstrate the ability to communicate effectively in writing."

- ✓ Clarity
- ✓ Grammar/Punctuation
- ✓ References

Verbal Communication: "Students should demonstrate the ability to communicate effectively
orally."

- ✓ Speaking Style
- ✓ Subject Matter

(g) An ability to communicate effectively, both in writing and orally (speaking / writing skills).

Written Communication: "Students should demonstrate the ability to communicate effectively in writing."

- ✓ Clarity
- ✓ Grammar/Punctuation
- ✓ References

Verbal Communication: "Students should demonstrate the ability to communicate effectively orally."

- ✓ Speaking Style
- ✓ Subject Matter

(h) The broad education necessary to analyze the local and global impact of computing and engineering solutions on individuals, organizations, and society (engineering impact assessment skills).

- ✓ Knowledge and understanding of commercial and economic context of engineering processes;
- ✓ Knowledge of management techniques which may be used to achieve engineering objectives within that context;

- ✓ Understanding of the requirement for engineering activities to promote sustainable development;
- ✓ Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety, and risk (including environmental risk) issues;
- ✓ Understanding of the need for a high level of professional and ethical conduct in Engineering.

(i) Recognition of the need for, and an ability to engage in continuing professional development and life-long learning (continuing education awareness).

Inspire the students to further explore in his/her program to recognize the need for lifelong learning. Some aspects of life-long learning:

- ✓ Project management professional certification
- ✓ Begin work on advanced degree
- ✓ Keeping current in CSE and advanced engineering concepts
- ✓ Personal continuing education efforts
- ✓ Ongoing learning – stays up with industry trends/ new technology
- ✓ Continued personal development
- ✓ Have learned at least 2-3 new significant skills
- ✓ Have taken up to 80 hours (2 wks) training per year

(j) A Knowledge of contemporary issues (social awareness).

Here the focus is on “knowledge” and is interpreted to mean the student’s obtaining in depth knowledge of at least on contemporary issue. Three types of examples are given – socioeconomic, political and environmental excluding contemporary, technical engineering issues since these are included in outcome “k” as well as in “a”.

(k) An ability to use current techniques, skills, and tools necessary for computing and engineering practice (practical engineering analysis skills).

Encompasses a wide range of tools and skills needed by engineering graduates including computer software, simulation packages, diagnostic equipment and use of technical library resources and literature search tools.

(l) An ability to apply design and development principles in the construction of software and hardware systems of varying complexity (software hardware interface).

- ✓ Designing and development of software programs, modifying existing computer software, testing of software systems, performing the related documentation work and consulting with other engineering professionals to assess the interface between the hardware and software.
- ✓ Closely work with other information technology professionals including programmers, engineers and system analysts to ensure that the software design is

feasible and analyze the specific requirements of users.

- ✓ Apart from developing new software programs, also work on exiting software programs to check for errors and eliminate them for improved performance.
- ✓ Consult with consumers/customers to comprehend the design requirements.
- ✓ Use a variety of scientific and mathematical techniques to predict the outcome of software designs.

(m) An ability to recognize the importance of professional development by pursuing postgraduate studies or face competitive examinations that offer challenging and rewarding careers in computing (successful career and immediate employment).

- ✓ Create a plan for success that connects their college education to future career.
- ✓ The successful career will involve in work which is tightly integrated. Work that is an extension of your core being is work that is satisfying, fulfilling, meaningful, and enjoyable. Work meeting a sure recipe for success.
- ✓ Graduates ready for immediate employment.
- ✓ Make a smooth transition into post graduate studies.

6. FACULTY OBJECTIVES

1) Teacher should try to upgrade his/her qualification & knowledge to keep himself/herself up to date about latest advancement in his field.
2) Teacher should submit report regarding (1) above to the concerned head of the department.
3) Teacher should read technical papers in the conferences/seminars & workshop etc. regularly and report the same to HOD
4) Every teacher should try to present/publish articles in National/International conferences/journals and submit a report after publication.
5) Every teacher should take advantage of workshops, summer/winter schools, etc and submit a report to HOD
6) Teacher should try for industrial exposure during vacations
7) To improve communication skill the teacher must speak English with his/her colleagues, students and inculcate in them the attitude of speaking English regularly.
8) Teacher should read and also motivate students to read books related to personality development.
9.) HOD should also implement the Mentor-Mentee system strictly so that performance each student could be closely monitored & watched.

7. LIST OF COURSES OFFERED IN COMPUTER SCIENCE AND ENGINEERING CURRICULUM

Code	Subject	a	b	c	d	e	f	g	h	i	j	k	l	m
B. Tech I Semester														
IPH -101/ ICH-101	Physics [a]/ Chemistry[a]	*												
IPC-101/ IES-101	Professional Comm.1[g,m]/ Environmental Studies [f,h,j]						*	*	*		*			*
IMA-101	Mathematics –I[a,m]	*												*
IEN-101/ IME-101	Basic Electrical Engineering[a,b,e]/ Basic Mechanical Engineering[	*	*			*								
ICS-101/ IEC-101	Computer Programming[c,e,i,k]/ Basic Electronics[a,b,e]			*		*				*		*		
IEL-101 / IME-102	English Language & Grammar[g,m] / Manufacturing Process							*						*
IPH-151/ ICH-151	Physics Lab [a]/ Chemistry Lab[a]	*												
IEN-151/ IME-151/ IBT-151	Electrical Engineering [a,b,e]/Mechanical Engineering/ Biology Lab	*	*			*								
ICS-151/ IWS-151	Computer Programming Lab[c,e,I,k]/ Workshop Practice			*		*						*	*	
ICE-151/ IPC-151	Engineering Graphics[a]/ Professional Comm. Lab[g,m]	*						*						*
B. Tech II Semester														
IPH -201/ ICH-201	Physics [a]/ Chemistry[a]	*												
IPC-201/ IES-201	Professional Comm.1[g,m]/ Environmental Studies[f,h,j]						*	*	*		*			*
IMA-201	Mathematics –II[a,m]	*												*
IEN-201/ IME-201	Basic Electrical Engineering[a,b,e]/ Basic Mechanical Engineering	*	*			*								
ICS-201/ IEC-101	Computer Programming [c,e,i,k]/ Basic Electronics[a,b,e]	*	*	*		*				*		*		
IEL-201/ IME-202	English Language & Grammar [g,m]/ Manufacturing Process							*						*
IPH-251/ ICH-251	Physics Lab[a] / Chemistry Lab[a]	*												
IEN-25 1/ IME-251/ IBT-251	Electrical Engineering[a,b,e]/ Mechanical Engineering/ Biology Lab	*	*			*								
ICS-251/	Computer Programming			*		*						*	*	

IWS-151	Lab[c,e,I,k]/ Workshop Practice													
ICE-251/ IPC-251	Engineering Graphics[a]/ Professional Comm. Lab [g,m]							*						*
B. Tech III Semester														
IHU 302/ HU-501	Principles of Management & Engineering Economics[j,l]										*		*	
ICS 301	Data Structure using 'C'[a,b,c,e,i,k,m]	*	*	*		*				*		*		*
ICS 302	Discrete Structure[a,c,e,j]	*		*		*		*						
ICS 303	Advanced Computer Programming [a,b,c,d,e,i,k]	*	*	*	*	*				*		*		
IEC305/ IEC401	Digital Electronics[a,b,d,e,k,m]	*	*		*	*						*		*
IHU-301 /ICS-305	Disaster Management[/ Cyber law & Information Security[f,j]						*				*			
IHU-303	* Human Values & Professional Ethics[c,d,f,g]			*	*		*	*						
ICS-351	Data Structure Lab[c,e,i,k]			*		*				*		*		
ICS-352	Programming Lab using VB[a,b,c,d,e,i,k]	*	*	*	*	*				*		*		
IEC-355/IE C451	Digital Electronics Lab[a,b,d,e,k,m]	*	*		*	*					*			*
ICS-353	Advanced Computer Programming Lab[a,b,c,d,e,i,k]	*	*	*	*	*				*	*			
B.Tech IV Semester														
IMA 402	Mathematical Analysis[a,m]	*												*
ICS 401	Computer Organization[a,b,c,d,e,m]	*	*	*	*	*								*
ICS 402	Object Oriented Programming & C++[c,e,i,k]			*		*				*		*		
ICS 403	Software Engineering[b,c,d,e,f,h,i,k ,m]		*	*	*	*	*		*	*	*	*		*
ICS 404	Data Base Management System[a,b,c,e]	*	*	*		*								

IHU-401 /ICS-405	Disaster Management/ Cyber law & Information Security[f,j]						*				*			
IHU-403	* Human Values & Professional Ethics[c,d,f,g]			*	*		*	*						
B. Tech V Semester														
ICS-501	Principles of Java Programming (c,e,i,k)			*		*				*		*		
ICS-502	Micro Processor & its application[a,b,c,d,e,i,k]	*	*	*	*	*				*		*		
ICS-503	Design & Analysis of Algorithm[a,b,c,e,i,k,m]	*	*	*		*				*		*		*
ICS-504	Principles of Operating System[a,b,c,e,i,k]	*	*	*		*				*		*		
ICS-505	Theory of Automata & formal languages[a,c,e,k]	*		*		*						*		
ICS-506	Software Project & Quality Mgmt.[a,f,g,h,l,m]	*					*	*	*				*	*
ICS-551	Java Programming Lab[c,e,i,k			*		*				*		*		
ICS-552	Micro Processor Lab[a,b,c,d,e,i,k]	*	*	*	*	*				*				
ICS-553	Design & Analysis of Algorithm Lab[a,b,c,e,i,k,m]	*	*	*		*						*		*
ICS-554	Mini Project[i,k,l]									*		*	*	
B. Tech VI Semester														
ICS-601	Visual Programming Techniques [c,e,i,k]			*		*				*		*		
ICS-602	Computer Networks[b,c,d,e,i,k]		*	*	*	*				*		*		
ICS-603	Open Source Software Technologies [c,e,i,k]			*		*				*		*		
ICS-604	Compiler Design [a,f,k]	*				*						*		
ICS-011	Principle of Programming Languages (Departmental Elective-1)[a,b,c,d,e,i,k]	*	*	*	*	*				*		*		
IMA-012	Principles of Operation Research(Departmental Elective-1)[a,b,e,i,j,k,l]	*	*			*					*	*	*	
ICS-012	Storage Technology and Management(Department al Elective-1)[b,d,e,k]		*		*	*						*		

ICS-013	Graph Theory(Departmental Elective-1)[e,k]					*						*		
ICS-605	Computer Architecture [a,b,c,d,e,m]	*	*	*	*	*								*
ICS-651	Visual Programming Techniques Lab [c,e,i,k]			*		*				*		*		
ICS-652	Computer Networks Lab [b,c,d,e,i,k]		*	*	*	*				*		*		
ICS-653	Open Source Software Technologies Lab [c,e,i,k]			*		*				*		*		*
ICS-654	Compiler Design Lab[a,f,k]	*					*					*		
B. Tech VII Semester														
CS-701	Artificial Intelligence[a,c,d]	*		*	*									
CS-702	Distributed Systems[a,b,c,e,i,k]	*	*	*		*				*		*		
CS-703	Cryptography and Network Security[c,d,e,i,k]			*	*	*				*		*		
CS-704	Digital Image Processing[a,c,d]	*		*	*									
CS-021	Data Compression (Departmental Elective-2)[a,b,c,d,e,h,i,k]													
CS 022	Computer Architecture (Departmental Elective-2)[a,b,c,d,e,m,g]	*	*	*	*	*		*						*
CS 023	Embedded System (Departmental Elective-2)[a,b,c,d,f,j]	*	*	*	*		*				*			
CS-751	Artificial Intelligence Lab[a,c,d]	*		*	*									
CS-752	Distributed Systems lab[[a,b,c,e,i,k]	*	*	*		*				*		*		
CS-754	Project[i,k,l]									*		*	*	
CS-755	Colloquium[i,k,l]									*		*	*	
B. Tech VIII Semester														
IT-801	Data Warehousing & Data			*		*				*		*		

	Mining[c,e,i,k]													
CS-801	Fuzzy Logic & Neural Networks[a,b,c,i,k,m]	*	*	*						*		*		*
CS 031	Mobile Computing (Departmental Elective-3)[c,d,e,i,k]			*	*	*				*		*		
CS 032	Expert Systems (Departmental Elective-3)[a,c,e,i,k,m]	*		*		*				*		*		*
CS 033	Advance concepts of TCP/IP (Departmental Elective-3)[b,c,d,e,I,k,m]		*	*	*	*						*	*	*
CS 041	Robotic System(Departmental Elective-4)[a,c,e,i,k]	*		*		*				*		*		
CS 042	Parallel Algorithms(Departmental Elective-4)[a,b,c,e,l,m]	*	*	*		*							*	*
CS 043	Real Time Systems(Departmental Elective-4)[a,b,e,k]	*	*			*					*			
CS 051	Advance Concepts in Database system(Departmental Elective-5)[a,b,c,e]	*	*	*		*								
CS 052	Natural Language Processing(Departmental Elective-5)[a,c,e,k]	*		*		*						*		
CS 053	GIS Terminology and its Applications(Departmenta l Elective-5)[a,c,k]	*		*								*		
CS-852	Advanced Technology Lab[c,e,i,k]			*		*				*		*		
CS-853	Project[i,k,l]									*		*	*	
CS-854	Industrial Interaction[i,k,l]									*		*	*	

8. METHODS OF MEASURING LEARNING OUTCOMES AND VALUE ADDED

Methodologies that are used to measure student learning each have their own limitations and biases,and no method can be counted on to be completely error free. That is why best practice in educational research dictates triangulating the data. If several different sources of data are used, it increases the probability that the findings present an accurate picture. We employ the following formal assessment procedures:

(1) University End-semester course evaluations
(2) Departmental mid-semester course evaluations
(3) Course portfolio evaluations
(4) Surveys from outgoing students
(5) Alumni feedback
(6) Department Board of Studies (BOS) meetings
(7) Faculty meetings
(8) Project work
(9) Job Placements
(10) Professional societies

Each is described in more detail below:

(1) University end-semester course evaluations:

University conducts end-semester examination for all courses. Evaluated exam copies are shown to the students before final results are declared. Result of each student is made available online on the university's website.

(2) Departmental mid-semester course evaluations:

The Computer Science and Engineering department conducts mid-semester tests for all courses. All departmental students are encouraged to fill out a brief survey on the state of the courses they are currently taking, and space is provided for a written comment. The results are reviewed by departmental BOS.

(3) Course portfolio evaluations:

We collect course portfolios from the instructor of each course offered in the given semester. The end-of semester survey encourages faculty to record what did and did not work well during this course offering and what changes should be made for the future. The faculty recommendations are solicited through e-mails and are discussed in the departmental BOS meet.

(4) Surveys from outgoing students:

Inputs from final year students are solicited annually through Computer Science and Engineering surveys The results are disseminated to the departmental BOS for analysis and discussion. The questionnaire is designed to survey overall facilities in the department, solicit about program experiences, as well as suggestions and comments. This instrument seeks to assess how students view the department's program in retrospect.

(5) Alumni feedback:

The alumni survey is a written questionnaire which alumni are asked to complete. We use this survey seeking input on the Program Objectives and Learning Outcomes based on their experience after graduation and after they have spent time in the working world. Alumni are an excellent resource with perspective on the value and advantages of their education. They are also resource for current students for potential networking and employment. The data will be analyzed and used in continuous improvement.

(6) Department BOS meetings:

The Computer Science and Engineering's departmental BOS includes a diverse group of experts from academics and industry, as well as alumni representation. The departmental BOS meets at least twice a year, or as needed, for a comprehensive review of the Computer Science and Engineering Department strategic planning and programs. The departmental BOS reviews the current courses based on the various feedback the department collects regularly. Amendments to the course content, and other such recommendations are prepared to be presented to the university's BOS meet.

(7) Faculty meetings:
The state of undergraduate program is always on the agenda at the monthly meeting of faculty. The faculty devotes a substantial amount of time to formal and informal discussions assessing the state of program and searching for improvements.

(8) Project work:
The final project reports, must demonstrate that students produced solutions to research/industry problems involving contemporary issues.

(9) Job Placements:
Data from the Carrier Counseling Guidance and Development cell on students' job placement reflects how successful our students are in securing a job in a related field.

(10) Professional societies:
The role of professional societies in introducing our students to technical, entrepreneurial and societal aspects of the field and in providing outstanding opportunities for lifelong learning makes them important constituents. The university supports a student chapter of the ACM and encourages student participation as a means for service, enhancing the profession, networking and leadership skills.