

**IMPORTANCE OF AUXILIARY COURSE IN UNDERGRADUATE ENGINEERING
PROGRAMME**

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Abstract

Technical institutes and colleges are growing up like mushroom in the recent years without having good curriculum, qualified faculty and staff, good infrastructure, opportunity of employability etc. Technical education plays an important role in the economic development of a country. Curriculum seems to be theoretical in nature and majority students after graduation are found unfit in the industry and job market. A good curriculum that is made with interaction between academician and industries is prime important to solve such problem. The main focus of this study is non-professional courses of undergraduate engineering program.

Index Terms—Curriculum reform, faculty, professional core course, engineering sciences, humanities and social sciences

I. INTRODUCTION

All Council for Technical Education (AICTE) was set up in November 1945 with the objective to excel Indian youths in the field of technical education in the country. It divides the curriculum of undergraduate engineering programs into eight main constituents with break up credits as shown below [1] :

1.	Humanities & Social Science (HSS) including Management Courses	(12)
2.	Basic Science Courses	(25)
3.	Engineering Science Courses including Workshop, Drawing, Basics of Electrical, Mechanical, Computer	(24)
4.	Professional Core Courses	(48)
5.	Professional Elective Courses relevant to chosen specialization/branch	(18)
6.	Open subject – Elective from other technical and/or emerging subjects	(18)
7.	Project Work, Seminar and Internship in Industry or elsewhere	(15)
8.	Mandatory Courses – Environmental Sciences, Induction Training, Indian Constitution, Essence of Indian Traditional Knowledge	(non-credit)

Total credit is 160 in BTech as prescribed by AICTE and minor variation is allowed as per the need of individual disciplines. This structure can be clubbed into two main categories combining serial numbers 1, 2, 3 and 8 under auxiliary courses and serial numbers 4, 5, 6 and 7 under main courses. Each category

of auxiliary courses is discussed in brief.

Humanities & Social Science (HSS) including Management Courses

Some subjects under HSS and Management courses in BTech are

1. English
2. Economics
3. Engineering Management
4. Industrial psychology

English is the medium of teaching in BTech throughout India as per syllabus. Almost all the prescribed textbooks, reference books and handbooks are written in English, even though there is no community in any state in India whose mother tongue is English. Question may be asked why the medium of teaching is English when nobody has English as her/his mother tongue. The simple answer is that almost all the scientific and technical terms are in English and translation of these terms instead of making these easy will produce more confusing. Say for examples, the words in Hindi and any regional language of scientific terms such as atom, molecules, equation, theorem etc, though there are, make us problem instead of solving or making it easier. However there are some states in the country whose government emphasizes to teach their students in their regional languages, for examples, medium of teaching in Uttar Pradesh, Bihar etc is in Hindi, not in English. Some of such students qualify JEE(main) and JEE(Advance) and join BTech in IITs, NITs, IIITs, CFTI, other central technical universities, state technical universities, government engineering colleges, private technical universities etc. Such students, even though they have very good scores in JEE(main) and JEE(Advance) face difficulty in the class, where faculty and staff deliver lectures in English. For information, there is one university in India, namely Atal Bihari Vajpayee Hindi Vishwavidyalaya, that has started courses in Hindi medium for electrical, mechanical and civil engineering streams [2].

On the other hand, those students who pass their XII standard from CBSE and English medium schools, after taking admission in BTech find easier to understand lectures in the classroom. Such students, not all, some of them are weak in writing grammatically. They speak English very easily without any problem and communicate their friends fluently. But they may be weak in writing. However, they do not consider themselves to be weak in English. English is not their mother tongue and this is why such inconvenience happens with them. We hardly think about grammar when we speak, but writing becomes a record, a document, a file etc, in which everybody who reads such document feels that it should be considered as a good English. This is why we study English grammar in English more seriously than Hindi grammar or a regional language grammar during the school days.

The medium of all the examinations including theory and practical is English. All engineering documents including manuals in offices, departments, institutes, industries, government and private organizations are written in English. Concerned people read and understand these materials. If these materials are not written in readable or presentable form, it will be difficult to implement or design based on them.

Engineering textbooks written in Hindi are available and government of India encourages those authors who write such books, but the users are very much limited. Some polytechnics in UP and Bihar teach engineering diploma in Hindi medium. The reason may be due to the fact that students in colleges have studied their school in Hindi medium and so, they may find difficulty to learn in English. But after diploma if such students want to join BTech under the lateral entry scheme have to switch in English medium. Such students also suffer if they do not make up to learn in English.

There is either one or two papers of economics in BTech course as prescribed by AICTE. Engineering students feel that these subjects are not related to them and they do not try to study such subjects seriously. They also know that employer hardly ask any question in the written examination for placement or employment. This is a great blunder with engineering students. Economics is very important subject not only for economics students, but also for government, military, engineer, scientist, doctor, law maker and everybody. We need this subject not only in family, but also in wherever we work. An engineer should know the budget and all related matters. If he/she does not take this subject, he/she may face complete failure in life, because everything is related to the money. This is why AICTE has given very strong emphasis on this subject.

Management is also an equally important subject of engineer. After completion of BTech course, the student will become an engineer, scientist, administrator, entrepreneur, businessman etc. She/he will work in different part of the country and may be even in a foreign country. She/he should know how to deal with people in such places either in the office or in public. So long as she/he respects other people, she/he will get the same treatment. She/he should understand other people, respect their culture, religion, food etc. She/he should never give any adverse comment on culture of the place, religion of those people, food habit whether it is non-vegetable or not. Even though, we develop such management skill with experience, it is always better if somebody teaches us during our BTech course.

Certain subject such as industrial psychology is very much important in BTech course so one can understand the mental characteristics or attitude of a person or group. It is always better to read in advance the mental attitude of people who work in the factory and the engineer has to play a major role. After working for a long time, workers suffer from fatigue and unwanted incident may happen. It is the responsibility of the engineer to do welfare of other people in his/her factory. This is why one should study such subject in BTech course.

Basic Science Courses

Three important basic science courses in BTech are the following:

1. Physics
2. Chemistry
3. Mathematics

These three subjects are compulsory and common subjects to all engineering BTech branches as prescribed by AICTE. Total credits is 25 including practical in Physics and Chemistry. We teach normally two papers of Physics in the first year of BTech, one or two papers of Chemistry in the first year of BTech and four or more papers of Mathematics in the first and second years of BTech course. Importance of certain topics of Physics, Chemistry and Mathematics is there depending on whether BTech course is Civil, Computer Science & Engineering, Electrical Engineering, Electronics & Communication Engineering, Mechanical Engineering and so on. All the professional courses depend on these three subjects of sciences and one becomes a good engineering only when she/he has very strong knowledge in these subjects. An empty concept of these subjects will results disaster as an engineer. These subjects are basic foundation of engineering course.

Besides, some more additional papers on Mathematics may be taught in BTech in certain engineering as per requirement. For examples, discrete mathematics, automata theory, graph theory and optimization are being taught in BTech in computer science & engineering. Either faculty from mathematics or computer department may teach these subjects based on manpower available. Similarly, other papers in mathematics may be taught in other BTech courses as per requirement.

Engineering Science Courses including Workshop, Drawing, Basics of Electrical, Mechanical, Computer

The following are common engineering subjects taught to all branches:

1. Programing Language
2. Engineering Mechanics
3. Basic Electrical Engineering
4. Engineering Drawing
5. Workshop

Programming language is common paper taught by department of computer science & engineering to all disciplines. Everyone in BTech irrespective of discipline uses computer for data processing, simulation, and documentation. An engineer skilled with computer knowledge has certain advantage to get his/her result of any simulation or prototype work. One should not feel that it is a computer paper and only computer student should study this paper. After completion of BTech degree, she/he will use computer and electronic mobile phone etc than anything in the office.

Engineering Mechanics is another important paper taught to all disciplines by the department of either mechanical or civil department. This subject is more important to mechanical and civil engineering and it is a core subject of these departments.

Basic electrical engineering is being taught to all engineering disciplines. It is taught by department of electrical engineering. It is an important subject to those BTech electrical and electronics & communication engineering students. Everybody uses electrical and electronics devices such bulb, mobile charger, UPS etc at home and in office [3]. An engineer should know at least some knowledge of electrical wherever she/he works, because technician or related people may not be available immediately.

Engineering Drawing is now an elective subject in XI and XII standards under CBSE, but it is compulsory subject for all engineering students of BTech. It is an important subject of mechanical and civil engineering departments. There are students who did MCA, MSc (Computer), MSc (IT) etc, but they do not have this subject. This is why these degrees are not the replacement for BTech. Computer science & engineering has computer graphics as a subject. Without preliminary knowledge of drawing we will find difficulty to understand the subject. Graphics depends on this subject. Wherever some drawing, figure, graph etc is there, this subject helps us in understanding.

Workshop is a compulsory subject for all BTech students of all disciplines. One learns how to use all mechanical equipments such as hammer, chisel, file etc on one hand and lathe machine, grinder etc on the other hand. Being an engineer, one cannot wait carpenter, smithy and concerned people. Wherever required, she/he has to use such type of equipment. This is why workshop becomes a compulsory subject with more practical than theory as prescribed by AICTE.

Mandatory Courses – Environmental Sciences, Induction Training, Indian Constitution, Essence of Indian Traditional Knowledge

Some main subjects under this heading are as follows:

1. Environment Sciences
2. Induction Training
3. Indian Constitution
4. Essence of Indian Traditional Knowledge

Environmental Science is an important subject for all people who live on this earth [4]. Our life is threatening day by day due to worsening of environment. It deals environmental chemistry, soil science, ecology, climatology, vegetation cover, marine and freshwater systems, as well as environmental remediation

and preservation, and agriculture and land use. As a subject, it is being taught by civil engineering department.

Everybody including faculty, staff, expert etc are involved in induction training. It is a form of introduction for new students in order to enable them to do their study and work in a new profession or job role within an organisation. In our context, it is to train the newly joined first year students of BTech in the preliminary of their study in engineering. There is a sudden shift in engineering discipline from XII standard level due to change from physics, chemistry and mathematics to engineering subjects. First year students are brought to different departments in the institute; they are taken to different local areas to know people, place and life. Eminent people gives interesting talk to them.

As an Indian, we all should know our constitution, because it is the law above all other laws in the country. We celebrate the Republic Day of India on 26th January every year, because our constitution was effective from 26th January 1950. Fundamental rights is the one of the most important components of our constitution and there are seven fundamental rights. These rights are Right to Freedom, Right to Equality, Cultural Rights, Educational Rights, Right to Constitutional Remedies, Right against Exploitation and Right to Privacy. Right to Privacy has been added recently.

We Indian should know the importance of Traditional knowledge. These knowledge are the knowledge of the folk lords and handed over from generation to the next generation from many years. But it seems that these knowledge are losing day by day. Younger generation should not be reluctant to carry forward these knowledge and they should respect these.

II. CONCLUSIONS

From the above discussion, we have come to know the importance of auxiliary courses in technical education, and without these it is not possible to excel in the professional core subjects. A better curriculum will narrow the gap between the academician and industrialist in the job market. A BTech student with strong foundation in auxiliary courses can excel in the main subjects in his/her discipline and a poor performance in these courses will result in unfit in employability in job market.

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