Department of Electronics and Communication Engineering
IPS Academy
Institute of Engineering & Science, Indore
(An Autonomous Institute)

Programme Educational Objectives

1. **Preparation**: To prepare students for excelling in undergraduate programs and succeed in the industry/technical profession through global, rigorous education.

2. **Core Competence**: To provide students with a solid foundation in mathematical, scientific, and engineering fundamentals required to solve complex engineering problems and also to pursue higher studies.

3. **Breadth**: To broaden educational areas with increasing knowledge/practice in Designing, Prototyping, Modeling, Data Analyzing, Logical Reasoning, and trouble solving approaches for real-life problems.

4. **Professionalism**: To inculcate in students' professional and ethical attitude, effective oral and written communication skills, teamwork skills, multidisciplinary approach, enhance alumni engagement, and an ability to relate engineering issues to broader social context, additional courses concerning self and career growth.

5. **R&D and Life-long Learning**: To provide the student with an academic environment aware of excellence, outstanding leadership, ethical codes and guidelines with moral values, and the life-long learning needed for a successful professional career and also promote research and development consultancy to open new doors for future.

Department of Electronics and Communication Engineering
IPS Academy
Institute of Engineering & Science, Indore
(An Autonomous Institute)

Programme Outcomes

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Department of Electronics and Communication Engineering
IPS Academy
Institute of Engineering & Science, Indore
(An Autonomous Institute)

Competencies and PI's

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	
Competency Indicators	**Performance Indicators**
1.1 Demonstrate competence in mathematical modeling .	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.1.2 Apply the concepts of probability, statistics and queuing theory in modeling of computer based system, data and network protocols
1.2 Demonstrate competence in basic sciences	1.2.1 Apply laws of natural science to an engineering problem
1.3 Demonstrate competence in engineering fundamentals	1.3.1 Apply engineering fundamentals
1.4 Demonstrate competence in specialized engineering knowledge to the program	1.4.1 Apply theory and principles of Electronics & Communication Engineering to solve an engineering problem
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
Competency Indicators	**Competency Indicators**
2.1 Demonstrate an ability to identify and formulate engineering problem	2.1.1 Evaluate problem statements and identifies objectives 2.1.2 Identifies processes/modules of an electronic system and parameters to solve a problem 2.1.3 Identifies mathematical algorithmic knowledge that applies to a given problem
2.2 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.1 Identifies functionalities and resources. 2.2.2 Identify existing solution/methods to solve the problem, including forming justified approximations and assumptions 2.2.3 Compare and contrast alternative solution/methods to select the best methods
2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply Electronics & Communication Engineering principles to formulate modules of a system with required applicability and performance. 2.3.2 Identify design constraints for required performance criteria.
2.4 Demonstrate an ability to execute a solution, process and analyze results	2.4.1 Applies engineering mathematics to implement the solution. 2.4.2 Analyze and interpret the results using contemporary tools. 2.4.3 Identify the limitations of the solution and sources/causes. 2.4.4 Arrive at conclusions with respect to the objectives.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	
Competency Indicators	**Competency Indicators**
3.1 Demonstrate an ability to define a complex	3.1.1 Able to define a precise problem statement with

/ open ended problem in engineering terms	objectives and scope. 3.1.2 Able to identify and document system requirements from stake holders. 3.1.3 Ability to review state of the art literature to synthesize system requirements. 3.1.4 Ability to choose appropriate quality attributes as defined by ISO/IEC/IEEE standard. 3.1.5 Explore and synthesize system requirements from larger social and professional concerns. 3.1.6 Ability to develop software & hardware requirement specifications (SRS).
3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Ability to explore design alternatives. 3.2.2 Ability to produce a variety of potential design solutions suited to meet functional requirements. 3.2.3 Identify suitable non functional requirements for evaluation of alternate design solutions.
3.3 Demonstrate an ability to select optimal design scheme for further development	3.3.1 Ability to perform systematic evaluation of the degree to which several design concepts meet the criteria. 3.3.2 Consult with domain experts and stakeholders to select candidate engineering design solution for further development
3.4 Demonstrate an ability to advance an engineering design to defined end state	3.4.1 Ability to refine architecture design into a detailed design within the existing constraints. 3.4.2 Ability to implement and integrate the modules. 3.4.3 Ability to verify the functionalities and validate the design.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	
Competency Indicators	**Competency Indicators**
4.1 Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.1 Define a problem for purposes of investigation, its scope and importance. 4.1.2 Ability to choose appropriate procedure/algorithm, data set and test cases. 4.1.3 Ability to choose appropriate hardware/software tools to conduct the experiment.
4.2 Demonstrate an ability to design experiments to solve open ended problems using research based knowledge	4.2.1 Design and develop appropriate procedures/methodologies based on the study objectives to design experiments
4.3 Demonstrate an ability to analyze data and reach a valid conclusion	4.3.1 Use appropriate procedures, tools and techniques to collect and analyze data. 4.3.2 Critically analyze data for trends and correlations, stating possible errors and limitations 4.3.3 Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions 4.3.4 Synthesize information and knowledge about the problem from the raw data to reach appropriate conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and	

IT tools including prediction and modeling to engineering activities with an understanding of the limitations.	
Competency Indicators	**Competency Indicators**
5.1 Demonstrate an ability to identify / create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities 5.1.2 Create/adapt/modify/extend tools and techniques to solve engineering problems
5.2 Demonstrate an ability to select and apply discipline specific tools, techniques and resources	5.2.1 Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs. 5.2.2 Demonstrate proficiency in using discipline specific tools
5.3 Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	5.3.1 Discuss limitations and validate tools, techniques and resources 5.3.2 Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	
Competency Indicators	**Competency Indicators**
6.1 Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, social, health, safety, legal and public welfare	6.1.1 Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at global, regional and local level
6.2 Demonstrate an understanding of professional engineering regulations, legislation and standards	6.2.1 Interpret legislation, regulations, codes, and standards relevant to your discipline and explain its contribution to the protection of the public
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	
Competency Indicators	**Competency Indicators**
7.1 Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts	7.1.1 Identify risks/impacts in the life-cycle of an engineering product or activity 7.1.2 Understand the relationship between the technical, socio economic and environmental dimensions of sustainability
7.2 Demonstrate an ability to apply principles of sustainable design and development	7.2.1 Describe management techniques for sustainable development 7.2.2 Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to the discipline
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	
Competency Indicators	**Competency Indicators**
8.1 Demonstrate an ability to recognize ethical dilemmas	8.1.1 Identify situations of unethical professional conduct and propose ethical alternatives
8.2 Demonstrate an ability to apply the Code of Ethics	8.2.1 Identify tenets of the ASME professional code of ethics 8.2.2 Examine and apply moral & ethical principles to known case studies

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	
Competency Indicators	**Competency Indicators**
9.1 Demonstrate an ability to form a team and define a role for each member	9.1.1 Recognize a variety of working and learning preferences; appreciate the value of diversity on a team 9.1.2 Implement the norms of practice (e.g. rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
9.2 Demonstrate effective individual and team operations-- communication, problem solving, conflict resolution and leadership skills	9.2.1 Maintain composure. 9.2.2 Demonstrate effective communication, problem solving, conflict resolution and leadership skills. 9.2.3 Treat other team members respectfully, Listen to other members in difficult situations.
9.3 Demonstrate success in a team based project	9.3.1 Present results as a team, with smooth integration of contributions from all individual efforts.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	
Competency Indicators	**Competency Indicators**
10.1 Demonstrate an ability to comprehend technical literature and document project work	10.1.1 Read, understand and interpret technical and nontechnical information 10.1.2 Produce clear, well-constructed, and well-supported written engineering documents 10.1.3 Create flow in a document or presentation - a logical progression of ideas so that the main point is clear
10.2 Demonstrate competence in listening, speaking, and presentation	10.2.1 Listen to and comprehend information, instructions, and viewpoints of others. 10.2.2 Deliver effective oral presentations to technical and nontechnical audiences.
10.3 Demonstrate the ability to integrate different modes of communication	10.3.1 Create engineering-standard figures, reports and drawings to complement writing and presentations. 10.3.2 Use a variety of media effectively to convey a message in a document or a presentation
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	
Competency Indicators	**Competency Indicators**
11.1 Demonstrate an ability to evaluate the economic and financial performance of an engineering activity	11.1.1 Describe various economic and financial costs/benefits of an engineering activity 11.1.2 Analyze different forms of financial statements to evaluate the financial status of an engineering project
11.2 Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity	11.2.1 Analyze and select the most appropriate proposal based on economic and financial considerations.
11.3 Demonstrate an ability to plan/manage an engineering activity within time and budget constraints	11.3.1 Identify the tasks required to complete an engineering activity and the resources required to complete the tasks. 11.3.2 Use project management tools to schedule an engineering project so it is completed on time and on budget.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent	

and life-long learning in the broadest context of technological change.	
Competency Indicators	**Competency Indicators**
12.1 Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps	12.1.1 Describe the rationale for requirement for continuing professional development 12.1.2 Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap
12.2 Demonstrate an ability to identify changing trends in engineering knowledge and practice	12.2.1 Identify historic points of technological advance in engineering that required practitioners to seek education in order to stay current 12.2.2 Recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in your field
12.3 Demonstrate an ability to identify and access sources for new information	12.3.1 Source and comprehend technical literature and other credible sources of information 12.3.2 Analyze sourced technical and popular information for feasibility, viability, sustainability, etc.

Department of Electronics and Communication Engineering
IPS Academy
Institute of Engineering & Science, Indore
(An Autonomous Institute)

Programme Specific Outcomes

1. Graduate will be able to understand basic Principles of Advanced Technologies used in Communication and VLSI and understand procedures and design principles which include software and hardware.
2. Graduate will be able to simulate, analyze and design wired/wireless communication systems and networks.

Department of Electronics and Communication Engineering
IPS Academy
Institute of Engineering & Science, Indore
(An Autonomous Institute)

PEO contribution in Dept. of EC Mission

PEO	Dept. of EC- Mission			
	1	2	3	4
1	H	-	M	H
2	H	-	-	H
3	H	M	H	H
4	-	H	-	M
5	-	H	H	L

H- high contribution, M- medium contribution, L- low contribution

PO contribution in PEO

PEO	PO											
	1	2	3	4	5	6	7	8	9	10	11	12
1	H	H	H	H	H	H	H	L	H	L	H	M
2	H	H	M	M	L	L	L	L	L	L	L	M
3	M	H	H	H	H	H	M	M	M	M	H	H
4	M	M	M	M	L	H	H	H	H	H	H	M
5	M	M	M	M	M	H	H	H	H	M	L	H

H- high contribution, M- medium contribution, L- low contribution