

Subject: Inclusion of Emerging areas in the scheme of studies of B.Tech. Courses for the award of Honors with Specialization/Minor Degree.

Kurukshetra University, Kurukshetra offers four B.Tech./UG programmes in Electronics and Communication Engineering, Computer Science and Engineering, Mechanical Engineering and Biotechnology with 160 credits each. Moreover, from the session 2020-21, the Institute has started offering various programmes/nomenclatures for B.Tech Honors with Specialization/Minor Degree in Emerging Areas as shown at next pages. The scheme of studies of B.Tech. Courses has been modified to include these Emerging Areas for the award of Honors with Specialization/Minor Degree subject to the condition that “Honors with Specialization/Minor Degree will cumulatively require additional **18 to 20 credits** in the specified area in addition to the credits essential for obtaining the Under Graduate Degree in Major Discipline (i.e. 160 credits)”. The required additional 18-20 credits may be earned by the students from the list of courses mentioned in **Tables 1-13** which are offered through the “Online Learning Courses provided through SWAYAM platform as per the AICTE (Credit Framework for online learning Course through SWAYAM) Regulations, 2016. The general guidelines for inclusion of SWAYAM courses in the scheme of studies for credit transfer are also specified at the end of this document. However, in future these courses can be replaced/modified by the Institute with the approval of the Board of Studies/Academic Council and courses offered by the Institute/University or other MOOCs platform for such purpose can also be included as per the prevailing conditions. Any such change will be properly notified to the students.

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**Nomenclature for &Tech. Degree in Emerging Areas of
Electronics and Communication Engineering**

- I. B.Tech. (Hons.) Electronics and Communication Engineering with Specialization in Artificial Intelligence and Machine Learning
2. B.Tech. (Hons.) Electronics and Communication Engineering with Specialization in Internet of Things (IoT)
3. B.Tech. (Hons.) Electronics and Communication Engineering with Specialization in Blockchain
4. B.Tech. (Hons.) Electronics and Communication Engineering with Specialization in Robotics
5. B.Tech. (Hons.) Electronics and Communication Engineering with Specialization in Data Science
6. B.Tech. (Hons.) Electronics and Communication Engineering with Specialization in Cyber Security
7. B.Tech. Electronics and Communication Engineering with Minor Degree in 3D Printing
8. B.Tech. Electronics and Communication Engineering with Minor Degree in Electric Vehicles
9. B.Tech. Electronics and Communication Engineering with Minor Degree in Energy Engineering
10. B_Tech. Electronics and Communication Engineering with Minor Degree in Mechatronics
11. B.Tech. Electronics and Communication Engineering with Minor Degree in Computer Science and Biology
12. B.Tech, Electronics and Communication Engineering with Minor Degree in Drug Engineering
13. B. Tech. Electronics and Communication Engineering with Minor Degree in Genome Engineering and Technology

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**Nomenclature for B.Tech. Degree in Emerging Areas of
Computer Science and Engineering**

1. B.Tech. (Hons.) Computer Science and Engineering with Specialization in Artificial Intelligence and Machine Learning
2. B.Tech. (Hons.) Computer Science and Engineering with Specialization in Blockchain
3. B.Tech. (Hons.) Computer Science and Engineering with Specialization in Data Science
4. B.Tech. (Hons.) Computer Science and Engineering with Specialization in Internet of Things (IoT)
5. B.Tech. (Hons.) Computer Science and Engineering with Specialization in Cyber Security
6. B.Tech. Computer Science and Engineering with Minor Degree in 3D Printing
7. B.Tech. Electronics and Communication Engineering with Minor Degree in Electric Vehicles
8. B.Tech. Computer Science and Engineering with Minor Degree in Energy Engineering
9. B.Tech. Computer Science and Engineering with Minor Degree in Robotics
10. B.Tech. Computer Science and Engineering with Minor Degree in Computer Science and Biology
11. B.Tech. Computer Science and Engineering with Minor Degree in Drug Engineering
12. B.Tech. Computer Science and Engineering with Minor Degree in Genome Engineering and Technology

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**Nomenclature for B.Tech. Degree in Emerging Areas of
Mechanical Engineering**

1. B.Tech. (Hons.) Mechanical Engineering with Specialization in 3D Printing
2. B.Tech. (Hons.) Mechanical Engineering with Specialization in Electric Vehicles
3. B.Tech. (Hons.) Mechanical Engineering with Specialization in Energy Engineering
4. B.Tech. (Hons.) Mechanical Engineering with Specialization in Robotics
5. B.Tech. (Hons.) Mechanical Engineering with Specialization in Mechatronics
6. B.Tech. Mechanical Engineering with Minor Degree in Artificial Intelligence and Machine Learning
7. B.Tech. Mechanical Engineering with Minor Degree in Blockchain
8. B.Tech. Mechanical Engineering with Minor Degree in Data Science
9. B.Tech. Mechanical Engineering with Minor Degree in Internet of Things (IoT)
10. B.Tech. Mechanical Engineering with Minor Degree in Cyber Security
11. B.Tech. Mechanical Engineering with Minor Degree in Computer Science and Biology
12. B.Tech. Mechanical Engineering with Minor Degree in Drug Engineering
13. B.Tech. Mechanical Engineering with Minor Degree in Genome Engineering and Technology

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Nomenclature for B.Tech. Degree in Emerging Areas of Biotechnology

1. B.Tech. (Hons.) Biotechnology with Specialization in Computer Science and Biology
2. B.Tech. (Hons.) Biotechnology with Specialization in Drug Engineering
3. B.Tech. (Hons.) Biotechnology with Specialization in Genome Engineering and Technology
4. B.Tech. Biotechnology with Minor Degree in Artificial Intelligence and Machine Learning
5. B.Tech. Biotechnology with Minor Degree in Blockchain
6. B.Tech. Biotechnology with Minor Degree in Data Science
7. B.Tech. Biotechnology with Minor Degree in Internet of Things (IoT)
8. B.Tech. Biotechnology with Minor Degree in Cyber Security
9. **B.Tech.** Biotechnology with Minor Degree in 3D Printing
10. B.Tech. Biotechnology with Minor Degree in Electric Vehicles
11. B.Tech. Biotechnology with Minor Degree in Energy Engineering
12. B.Tech. Biotechnology with Minor Degree in Robotics

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Table 1: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Artificial Intelligence and Machine Learning

Artificial Intelligence and Machine Learning

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject/s which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|-------------|---|
| 1. | SPMD/AI-1A | Artificial Intelligence; Search Methods For Problem solving |
| | | OR |
| | SPMD/AI-2A | An Introduction to Artificial Intelligence |
| 2. | SPMD/AI-3A | Artificial Intelligence: Knowledge Representation and Reasoning |
| | SPMD/AI-4A | Programming, Data Structures and Algorithms in Python |
| | | OR |
| 3. | SPMD/AI-5A | Python for Data Science |
| 4. | SPMD/AI-6A | Introduction to Machine Learning |
| 5. | SPMD/AI-7A | Deep Learning |
| | | OR |
| | SPMD/AI-8A | Deep Learning for Computer Vision |
| 6. | SPMD/AI-9A | Reinforcement Learning |
| 7. | SPMD/AI-10A | AI: Constraint Satisfaction |
| 8. | SPMD/AI-11A | Computer Vision |
| 9. | SPMD/AI-12A | Natural Language Processing |
| | | OR |
| | SPMD/AI-13A | Applied Natural Language Processing |
| 10. | SPMD/AI-14A | Practical Machine Learning with Tensorflow |
| 11. | SPMD/AI-15A | Introduction to Data Analytics |
| | | OR |
| | SPMD/AI-16A | Data Science for Engineers |
| 12. | SPMD/AI-17A | Learning Analytics Tools |
| 13. | SPMD-1A | Design Thinking - A Primer |
| 14. | SPMD-2A | Ethics in Engineering Practice |

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Table 2: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Internet of Things (IoT)

Internet of Things (IoT)

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subjects which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|--------------|---|
| 1. | SPMD/IoT-1A | Introduction to Industry 4.0 and Industrial Internet of Things OR |
| | SPMD/IoT-2A | Introduction to Internet of Things |
| 2. | SPMD/IoT-3A | Electronic Systems for Sensor Applications |
| 3. | SPMD/IoT-4A | Optical Fiber Sensors OR |
| | SPMD/IoT-5A | Optical Sensors |
| 4. | SPMD/IoT-6A | Introduction to Machine Learning |
| 5. | SPMD/IoT-7A | Selection of Nanomaterials for Energy Harvesting and Storage Application |
| 6. | SPMD/IoT-8A | Python for Data Science |
| 7. | SPMD/IoT-9A | Deep Learning OR |
| | SPMD/IoT-10A | Deep Learning for Computer Vision |
| 8. | SPMD/IoT-11A | Reinforcement Learning |
| 9. | SPMD/IoT-12A | Cloud computing OR |
| | SPMD/IoT-13A | Google Cloud Computing Foundations |
| 10. | SPMD/IoT-14A | Modem Application Development |
| 11. | SPMD/IoT-15A | Introduction to Data Analytics OR |
| | SPMD/IoT-16A | Data Science for Engineers |
| 12. | SPMD/IoT-17A | Computer Networks and Internet Protocol |
| 13. | SPMD/IoT-18A | Introduction to Database Systems |
| 14. | SPMD-1A | Design Thinking — A Primer |
| 15. | SPMD-2A | Ethics in Engineering Practice |

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Table 3; List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Blockchain

Blockchain

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject/s which are counted for earning 160 credits- of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|-------------|--|
| 1. | SPMD/BL-1A | Introduction to Blockchain Technology and Applications |
| | | OR |
| | SPMD/BL-2A | Blockchain Architecture Design and Use Cases |
| 2. | SPMD/BL-3A | Introduction to Internet of Things |
| 3. | SPMD/BL-4A | Information Security — 5 — Secure Systems Engineering |
| 4. | SPMD/BL-5A | Introduction to Machine Learning |
| 5. | SPMD/BL-6A | Ethical Hacking |
| 6. | SPMD/BL-7A | GPU Architectures and Programming |
| 7. | SPMD/BL-8A | Computer Networks and Internet Protocol |
| 8. | SPMD/BL-9A | Cloud computing |
| | | OR |
| | SPMD/BL-10A | Google Cloud Computing Foundations |
| 9. | SPMD/BL-1A1 | Foundations of Cryptography |
| 10. | SPMD/BL-12A | Information Theory and Coding |
| 11. | SPMD/BL-13A | Introduction to Database Systems |
| 12. | SPMD/BL-14A | Internetwork Security |
| 13. | SPMD-1A | Design Thinking — A Primer |
| 14. | SPMD-2A | Ethics in Engineering Practice |

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Table 4: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Robotics

Robotics

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject/Is which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|--------------|--|
| 1. | SPMD/R13-1A | Foundations of Cognitive Robotics |
| 2. | SPIVID/RB-2A | Introduction to Robotics |
| | | OR |
| | SPMD/RB -3A | Robotics |
| 3. | SPMD/RB-4A | Mechanism and Robot Kinematics |
| 4. | SPMD/RB-5A | Computer Architecture and Organization |
| 5. | SPMD/RB-6A | Power Electronics |
| 6. | SPMD/RB-7A | Principle of Hydraulic Machines and System Design |
| 7. | SPMD/RB-8A | Programming, Data Structures and Algorithms Using Python |
| 8. | SPMDTRB-9A | Control Systems |
| 9. | SPMD/RB-10A | Fundamentals of Artificial Intelligence |
| 10. | SPMD/RB-11A | Introduction to Machine Learning |
| 11. | SPMD/RB-12A | Dynamical System and Control |
| 12. | SPMD/RB-13A | Introduction to Embedded System Design |
| 13. | SPMD/RB-14A | Introduction to Internet of Things |
| | | OR |
| | SPMD/RB-15A | Introduction to Industry 4.0 and Industrial Internet of Things |
| 14. | SPMD-1A | Design Thinking — A Primer |
| 15. | SPMD-2A | Ethics in Engineering Practice |

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**Table 5: List of elective subjects for acquiring additional 18-20 credits for 13.Tech (Hons.)
with Specialization/Minor Degree in Data Science**

Data Science

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subjects which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|--------------------|---|
| 1. | SPMD/DS-1A | Python for Data Science |
| | | OR |
| | SPMD/DS-2A | Programming, Data Structures and Algorithms in Python |
| 2. | SPMD/DS-3A | Introduction to Data Analytics |
| | | OR |
| | SPMD/DS-4A | Data Science for Engineers |
| 3. | SPMD/DS-5A | Programming, Data Structures and Algorithms in Python |
| | | OR |
| | SPMD/DS-6A | Python for Data Science |
| 4. | SPMD/DS-7A | Introduction to Machine Learning |
| 5. | SPMD/DS-8A | Deep Learning |
| | | OR |
| | SPMD/DS-9A | Deep Learning for Computer Vision |
| 6. | SPMD/DS-10A | Reinforcement Learning |
| 7. | SPMD/DS-11A | Artificial Intelligence: Search Methods For Problem solving |
| | | OR |
| | SPMDIDS-12A | An Introduction to Artificial Intelligence |
| 8. | SPMD/DS-13A | Artificial Intelligence: Knowledge Representation and Reasoning |
| 9. | SPMD/DS-14A | Computer Vision |
| 10. | SPMD/DS-15A | Natural Language Processing |
| | | OR |
| | SPMD/DS-16A | Applied Natural Language Processing |
| 11. | SPMD/DS-17A | Practical Machine Learning with Tensorflow |
| 12. | SPMD/DS-18A | Learning Analytics Tools |
| 13. | SPMD-1A | Design Thinking — A Primer |
| 14. | SPMD-2A | Ethics in Engineering Practice |

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Table 6: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Cyber Security

Cyber Security

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject/s which are counted for earning 160 credits of the degree will not be counted for acquiring lions. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|---------------|---|
| 1. | SPMD/CS-1A | Cryptography And Network Security |
| 2. | SPMDICS-2A | Ethical Hacking |
| 3. | SPMD/CS-3A | Information Security — 5 — Secure Systems Engineering |
| 4. | SPMD/CS-4A | Privacy and Security in Online Social Media |
| 5. | SPMD/CS-5A | Information Theory and Coding |
| 6. | SPMD/CS-6A | Introduction to Information Security |
| 7. | SPMD/CS-7A | Introduction to Cryptology |
| 8. | SPMD/CS-8A | Computational Number Theory & Cryptography |
| 9. | SPMD/CS-9A | Hardware Security |
| 10. | SPMD/CS- I 0A | Intemetwork Security |
| 11. | SPMD/CS-11A | Introduction to Machine Learning |
| 12. | SPMD/CS-12A | introduction to Internet of Things |
| 13. | SPMD-1A | Design Thinking — A Primer |
| 14. | SPMD-2A | Ethics in Engineering Practice |

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**Table 7: List of elective subjects for acquiring additional 18-20 credits for B.Tech
(Hons.) with Specialization/Minor Degree in 3D Printing**

3D Printing

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject/s which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|----------------|-------------|---|
| 1. | SPMD/3D-1A | Rapid Manufacturing |
| 2. | SPMD/3D-2A | Electronics Equipment Integration and Prototype Building |
| 3. | SPMD/3D-3A | Product Design and Development |
| 4. | SPMD/3D-4A | The Future of Manufacturing Business: Role of Additive Manufacturing |
| 5. | SPMD/3D-5A | Functional and Conceptual Design |
| 6. | SPMD/3D-6A | Introduction to Polymer Science |
| 7. | SPMD/3D-7A | Innovation by Design |
| 8. | SPMD/3D-8A | Design, Technology and Innovation |
| 9. | SPMD-1A | Design Thinking — A Primer |
| 10. | SPMD-2A | Ethics in Engineering Practice |

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Table 8: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Electric Vehicles

Electric Vehicles

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject/s which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|----------------|--------------|--|
| 1. | SPMD/EV- 1A | Fundamentals of Electric Vehicles: Technology & Economics |
| 2. | SPMD/EV-2A | Fundamentals of Electrical Engineering |
| 3. | SPMDIEV-3A | Electrical Machines |
| 4. | SPMDIEV-4A | Physics of Materials |
| | | OR |
| | SPMD/EV-5A | Powder Metallurgy |
| 5. | SPMD/EV-6A | Introduction to CFD |
| 6. | SPMD/EV-7A | Structural Analysis of Nanomaterials |
| 7. | SPMD/EV-8A | Ecology and Environment |
| 8. | SPMD/EV-9A | Dynamic Behavior of Materials |
| 9. | SPMD/EV-10A | Welding of Advanced High Strength Steels for Automotive Applications |
| 10. | SPMD/EV- 11A | Dynamical System and Control |
| 11. | SPMD-1A | Design Thinking - A Primer |
| 12. | SPMD-2A | Ethics in Engineering Practice |

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**Table 9: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.)
with Specialization/Minor Degree in Energy Engineering**

Energy Engineering

(Minimum credits to be earned are EIGHTEEN-TWENTY)

*Note: Credit of the subject/s which are counted for earning 160 credits of the degree will not
be counted for acquiring Hons. with Specialization/Minor Degree.*

| Sr. No. | Code | Subject Nomenclature |
|---------|-------------|---|
| 1. | SPMD/EE-1A | Fundamentals of Conduction and Radiation |
| | | OR |
| | SPMD/EE-2A | Fundamentals of Convective Heat Transfer |
| 2. | SPMD/EE-3A | Energy Conservation and Waste Heat Recovery |
| 3. | SPMD/EE-4A | Ecology and Environment |
| 4. | SPMD/EE-5A | Energy Economics and Policy |
| 5. | SPMD/EE-6A | Bioenergy |
| | | OR |
| | SPMD/EE-7A | Waste to Energy Conversion |
| 6. | SPMD/EE-8A | Non-Conventional Energy Resources |
| | | OR |
| | SPMD/EE-9A | Technologies for Clean and Renewable Energy Production |
| 7. | SPMD/EE-10A | Selection of Nanomaterials for Energy Harvesting and Storage Application |
| 8. | SPMD/EE-11A | Solar Energy Engineering and Technology |
| 9. | SPMD-1A | Design Thinking - A Primer |
| 10. | SPMD-2A | Ethics in Engineering Practice |

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**Table 10: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.)
with Specialization/Minor Degree in Mechatronics**

Mechatronics

(Minimum credits to be earned are EIGHTEEN-TWENTY)

*Note: Credit of the subject/s which are counted for earning 160 credits of the degree will not
be counted for acquiring Hons. with Specialization/Minor Degree.*

| Sr. No. | Code | Subject Nomenclature |
|-----------|-------------------|--|
| 1. | SPMD/ME-1A | Power Electronics |
| 2. | SPMD/ME-2A | Semiconductor Optoelectronics |
| OR | | |
| | SPMD/ME-3A | Semiconductor Devices and Circuits |
| 3. | SPMD/ME-4A | Digital Circuits |
| 4. | SPMD/ME-5A | Analog Electronic Circuits |
| 5. | SPMD/ME-6A | Control Systems |
| OR | | |
| | SPMD/ME-7A | Control Engineering |
| 6. | SPMD/ME-8A | Introduction to Internet of Things |
| 7. | SPMD/ME-9A | Introduction to Fuzzy Set Theory, Arithmetic and Logic |
| OR | | |
| | SP MD/ME-10A | Switching Circuits and Logic Design |
| 8. | SPMD/M E-11A | Microcontrollers and Applications |
| 9. | SPMD/ME-12A | Introduction to Embedded System Design |
| 10. | SPMD/ME-I3A | Introduction to Robotic |
| 11. | SPMD/ME-14A | Optical Fiber Sensors |
| 12. | SPMD/ME-15A | Automation in Manufacturing |
| 13. | SPMD-1A | Design Thinking - A Primer |
| 14. | SPMD-2A | Ethics in Engineering Practice |

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Table 11: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Computer Science and Biology

Computer Science and Biology

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject's which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|-----------|---------------|--|
| 1. | SPMD/CB-1A | Computational Systems Biology |
| 2. | SPMD/CB-2A | Introduction to Database Systems |
| 3. | SPMD/CB-3A | Introduction to Artificial Intelligence |
| OR | | |
| | SPMD/CB-4A | Artificial Intelligence Search Methods for Problem Solving |
| 4. | SPMD/CB-5A | Image Signal Processing |
| 5. | SPMD/CB-6A | Introduction to Internet of Things |
| 6. | SPMD/CB-7A | Introduction to Computer Graphics |
| OR | | |
| | SPMD/CB-8A | Computer Graphics |
| 7. | SPMD/CB-9A | MATLAB Programming for Numerical Computation |
| 8. | SPMD/CB-10A | Programming, Data Structures and Algorithms in Python |
| 9. | SPMD/CB- I 1A | Introduction to Machine Learning |
| 10. | SPMD/CB-12A | Data Mining |
| 11. | SPMD/CB-13A | Introduction to Dynamical Models in Biology |
| 12. | SPMD/CB-14A | Biometrics |
| 13. | SPMD/CB-15A | Bioinformatics: Algorithms and Applications |
| 14. | SPMD/CB-16A | Introduction to Proteogenomics |
| 15. | SPMD/CB-17A | Foundations of Cryptography |
| 16. | SPMD/CB-18A | Modern Application Development |
| 17. | SPMD/CB-19A | Ethical Hacking |
| 18. | SPMD/CB-20A | Computer Aided Drug Design |
| 19. | SPMD/CB-21A | Functional Genomics |
| 20. | SPMD-1A | Design Thinking - A Primer |
| 21. | SPMD-2A | Ethics in Engineering Practice |

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Table 12: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Drug Engineering

Drug Engineering

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subject/s which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|-------------|--|
| 1. | SPMD/DE-1A | Drug Delivery: Principles and Engineering |
| 2. | SPMD/DE-2A | Experimental Biotechnology |
| 3. | SPMD/DE-3A | Spectroscopic Techniques for Pharmaceutical and Biopharmaceutical Industries |
| 4. | SPMD/DE-4A | Environmental Quality Monitoring & Analysis |
| 5. | SPMD/DE-5A | Computer Aided Drug Design |
| 6. | SPMD/DE-6A | Current Regulatory Requirements for Conducting Clinical Trials in India for Investigational New Drugs/New Drug |
| 7. | SPMD/DE-7A | Introduction to Dynamical Models in Biology |
| 8. | SPMD/DE-8A | Medical Biomaterials |
| 9. | SPMD/DE-9A | Metals in Biology |
| 10. | SPMD/DE-10A | Gene Therapy |
| 11. | SPMD/DE-11A | Introduction to Cardiovascular Fluid Mechanics |
| 12. | SPMD/DE-12A | Optical Sensors |
| 13. | SPMD/DE-13A | Nano Structured Materials- Synthesis, Properties, Self-assembly and Applications |
| 14. | SPMD/DE-14A | Transport Phenomena in Biological Systems |
| 15. | SPMD/DE-15A | Aspects of Biochemical Engineering |
| 16. | SPMD/DE-16A | Process Control Design, Analysis and Assessment |
| 17. | SPMD/DE-17A | Industrial Biotechnology |
| 18. | SPMD/DE-18A | Interactomics |
| 19. | SPMD/DE-19A | Health Research Fundamentals |
| 20. | SPMD/DE-20A | Computational Systems Biology |
| 21. | SPMD/DE-21A | Human Molecular Genetics |
| 22. | SPMD-1A | Design Thinking - A Primer |
| 23. | SPMD-2A | Ethics in Engineering Practice |

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Table 13: List of elective subjects for acquiring additional 18-20 credits for B.Tech (Hons.) with Specialization/Minor Degree in Genome Engineering & Technology

Genome Engineering & Technology

(Minimum credits to be earned are EIGHTEEN-TWENTY)

Note: Credit of the subjects which are counted for earning 160 credits of the degree will not be counted for acquiring Hons. with Specialization/Minor Degree.

| Sr. No. | Code | Subject Nomenclature |
|---------|-------------|---|
| 1. | SPMD/GE-1A | Introduction to Proteogenomics |
| 2. | SPMD/GE-2A | Interactomics: Basics & Applications |
| 3. | SPMD/GE-3A | Drug Delivery: Principles and Engineering |
| 4. | SPMD/GE-4A | Experimental Biotechnology |
| 5. | SPMD/GE-5A | Bioengineering: An Interface with Biology and Medicine |
| 6. | SPMD/GE-6A | Functional Genomics |
| 7. | SPMD/GE-7A | Protein and Gel Based Proteomics |
| 8. | SPMD/GE-8A | Cell Culture Technologies |
| 9. | SPMD/GE-9A | Tissue Engineering |
| 10. | SPMD/GE-10A | Biomedical Nanotechnology |
| 11. | SPMD/GE-11A | Introductory Mathematical Methods for Biologists |
| 12. | SPMD/GE-12A | Nanotechnology in Agriculture |
| 13. | SPMD/GE-13A | Introduction to Proteomics |
| 14. | SPMME-14A | Applications of Interactomics using Genomics and Proteomics Technologies |
| 15. | SPMD/GE-15A | Transport Phenomena in Biological Systems |
| 16. | SPMD/GE-16A | Proteomics and Genomics |
| 17. | SPMD/GE-17A | Medical Biomaterials |
| 18. | SPMD/GE-18A | Thermodynamics for Biological Systems: Classical and Statistical Aspect |
| 19. | SPMD/GE-19A | Mass Spectrometry Based Proteomics |
| 20. | SPMD/GE-20A | Advanced Clinical Proteomics |
| 21. | SPMD/GE-21A | Application of Spectroscopic Methods in Molecular Structure Determination |
| 22. | SPMD/GE-22A | Gene Therapy |
| 23. | SPMD-1A | Design Thinking - A Primer |
| 24. | SPMD-2A | Ethics in Engineering Practice |

KURUKSHETRA UNIVERSITY, KURUKSHETRA

(Established by the State Legislature Act XII of 1956)

('A+' Grade NAAC Accredited)

Guidelines to implement the MOOCs/ SWAYAM online courses in the Institute

In pursuance to the Gazette Notification No. 295 dated 19th July 2016 of University Grants Commission notifying the "UGC (Credit Framework for Online Learning Courses through SWAYAM) Regulations, 2016" for adoption of MOOCs (Massive Open Online Courses) through SWAYAM (Study Web of Active Learning by Young and Aspiring Mind) platform, Kurukshetra University, Kurukshetra has framed the following guidelines for implementation of Online courses in all the Institute:

1. These guidelines shall be called the "Guidelines to implement the SWAYAM/MOOCs/ other authorized online courses (OAOC), in the Institute".

2. These guidelines shall apply to the transfer of credits of such students who are enrolled as students in any of the department of the Institute.

3. These shall come into force from the date of approval of the Academic Council of the Institute/University.

4. The procedure for adopting Online Learning Courses:

4.1 The Principal Investigator (PI), a Subject Matter Expert entrusted by the National MOOCs Coordinator (NMC) or equivalent agency will offer the online learning courses for the forthcoming Semester through an institution (called Host Institution). The courses will be made available through the online portal twice a year (for odd semester and even semester).

4.2 Once the list of online learning courses to be offered in the forthcoming Semester is available on SWAYAM/NPTEL (National Programme on Technology Enhanced Learning)/ Authorized Portal Offering Online Courses (APOOC), Head/Faculty Incharge of the Department shall notify a list of courses from SWAYAM/NPTEL portal/APOOC keeping in view the academic requirements of students, subject to the approval of Academic Council of the Institute/University.

4.3 The Head/Faculty Incharge of the Department will recommend the courses of SWAYAM/NPTEL/OAOC to the Authorities of the Institute/University, if:

4.3.1 There is non-availability of suitable teaching staff or running a course in the department.

4.3.2 The facilities for offering the elective papers (courses), sought for by the students are not on offer in the department, but are available on the SWAYAM/NPTEL/APOOC platform.

4.3.3 The courses offered on SWAYAM/NPTEL/APOOC would supplement the teaching-learning process in the department.

4.4 The Head/Faculty Incharge of the Department shall ensure that the physical facilities like laboratories, computer facilities, library etc., as essential for pursuing the courses, are available in adequate measure.

4.5 Every student is required to register for and complete (minimum) one course out of those offered by the department and pay for the certification registration fee on the online platform of the portal meant for it.

4.6 The constituent college/school must designate an Online Course Coordinator (OCC) in the respective department along with a relevant course faculty (for each SWAYAM/NPTEL/OAOC course) who will be responsible to guide the students throughout the course and to facilitate/conduct the Lab/Practical Sessions/examinations. The OCC will monitor compliance of these guidelines, keeping the Head/Faculty Incharge apprised of the progress, time to time, and also collect relevant documents from each online course faculty for record purposes, at the end of a course.

5. Evaluation and Certification of SWAYAM/MOOCs/Online courses:

5.1 The Host Institution and the PI shall be responsible for evaluating the students registered for the MOOCs course launched by him/her.

5.2 The evaluation done by the Host Institution shall be based on predefined norms and parameters and shall be on a comprehensive evaluation throughout the length and breadth of course based on specified instruments like discussions, forums, quizzes, assignments, sessional examinations and final examination.

5.3 The examination for certification may be in online mode or a pen & paper mode as decided by PI and Host Institution. This shall be announced by the PI/Host Institution in the overview of the Course at the time it is offered.

5.4 In case, a pen and paper final examination is to be conducted, the same shall be offered through any college/school volunteering to conduct the same. The decision in this respect will be of the PI and the Host Institution.

5.5 After conduct of the examination and completion of the evaluation, the PI through the Host Institution shall award marks/grade as per the evaluation scheme announced.

5.6 The final marks/grade shall be communicated to the students as well as the department/Institute/University generally within four weeks from the date of completion of the final examination.

5.7 The concerned department shall forward the marks/grade to the Office of the Controller of Examinations to incorporate into mark sheet/grade card of the students.

5.8 The Office of the Controller of Examinations shall give the equivalent credit weightage to the students for the credits earned through online learning courses (not

more than 20% of courses in any semester). In case the completed course has been selected by the student towards the grant of Minor degree/Hons. in a particular Emerging Area offered by the Institute, it should clearly be specified by the student and verified and communicated to the Office of the Controller of Examinations by the Heads/ Faculty Incharge.

5.9 These marks/grade will be reflected on the student's mark sheet/grade card and may be counted for final award of the degree by the University.

5.10 The courses in which Lab/Practical Component is involved, the concerned department shall evaluate the students for the practical/lab component and the marks/grade obtained by the students be forwarded to the Office of the Controller of Examinations for incorporation into marks sheet/grade card.

5.11 The PI through its Host Institution will send to Department/Institute/University Certificate(s) in respect of all those students who would have successfully completed the MOOCs course. Heads/Faculty Incharge of the concerned department will ensure the award of these certificates to the concerned students.