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| IIUM_logo_bw_tinyINTERNATIONAL ISLAMIC UNIVERSITY MALAYSIACOURSE OUTLINE | | | | | | | |
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| Kulliyyah / Institute | | | Engineering | | | | |
| Department / Centre | | | Mechatronics Engineering | | | | |
| Programme | | | B. Eng (Mechatronics) (Honours) | | | | |
| **Name of Course / Mode** | | | Remote Sensing and Telemetry /Full time | | | | |
| **Course Code** | | | MCT 4336 | | | | |
| **Name (s) of Academic staff / Instructor(s)** | | | Dr Muhammad Mahbubur Rashid | | | | |
| **Rationale for the inclusion of the course / module in the programme** | | | Elective course for Mechatronics Engineering Programme | | | | |
| **Semester and Year Offered** | | | Alternate semester | | | | |
| **Status** | | | Elective | | | | |
| **Level** | | | 4 | | | | |
| **Proposed Start Date** | | |  | | | | |
| **Batch of Student to be Affected** | | |  | | | | |
| **Total Student Learning Time (SLT)** | | | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Face to Face** | | | **Assessments** | | Independent Learning | **Total Student Learning Time** | | Lecture | Tutorial | Practical | Midterm | Final | | 34 | 8 |  | 2 | 3 | 73 | **120** | | | | | |
| **Credit Value / Hours** | | | 3/120 | | | | |
| **Pre-requisites** *(if any)* | | | MCT 3332, MCT 4338 | | | | |
| **Co-requisites** *(if any)* | | | None | | | | |
| **Course Objectives** | | | The objective of this course are to:   1. Introduce students to remote sensing and telemetry technique. 2. Expose students to applications of remote sensing and telemetry in instrumentation, control and industry. 3. Expose students to various procedures of signal handling for different applications in remote sensing and telemetry. 4. Familiarize students with remote sensing hardware and software systems. | | | | |
| **Learning Outcomes** | | | At the end of this course students should be able to:   1. Illustrate Remote sensing and Telemetry systems. 2. Relate sensors and modems for remote sensing and telemetry. 3. Select appropriate analog and digital communication systems for Telemetry. 4. Develop Telemetry Link-RF systems. 5. Construct a design project in groups on the implementation of telemetry systems in target applications and present the results in oral and writing. | | | | |
| **Transferable Skills:** | | | *Skills and how they are developed and assessed:*   |  |  |  | | --- | --- | --- | | **Skills** | **Development** | **Assessment** | | Technical | Lectures | Written Assessment | | Analytical | Projects | Report | |  |  |  | | | | | |
| **Teaching-Learning and assessment strategy** | | | Lectures, Projects report and Quizzes | | | | |
| **Course Synopsis** | | | Classifications of remote sensing and telemetry, Components of remote sensing and telemetry, Fundamentals of telemetry systems, Data acquisition and distribution systems, Multiplexing and demultiplexing, Modulation and Demodulation, Digital Communication and Protocols, Telemetry design system. Practical telemetry system in Industry. | | | | |
| **Mode of Delivery** | | | *Lecture, Tutorial, Workshop, Seminar etc.* | | | | |
| **Assessment Methods and Type/Course Assessement**  State weightage of each type of assessment. | | | |  |  |  | | --- | --- | --- | | **LO** | **Method** | **%** | | 1,2,3 | Mid-term Test | 25 | | 2,3,4,5 | Final Examination | 40 | | 1,2,3,4,5 | Quiz | 15 | | 1,2,3,4,5 | Assignments/project | 20 | | | | | |
| **Mapping of course / module to the Programme Learning Outcomes** | | | | | | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Learning Outcome of the course | Programme Outcomes | | | | | | | | | | | | | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | | **Illustrate Remote sensing and Telemetry systems.** |  | √ |  |  |  |  |  |  |  |  |  |  | | **Relate s nsors   d modem  fo  remot   ensing and telemetry** |  |  | **√** |  |  |  |  |  |  |  |  |  | | **Select appropriate analog and digital communication systems fo  Telemetry.** |  |  |  | **√** |  |  |  |  |  |  |  |  | | **Dev lop Telemetry Li k-RF syst m .** |  |  |  |  | **√** |  |  |  |  |  |  |  | | **Construct a design project in  roups on the implemen ation    teleme ry  ystems i  target applications and present the results in oral and writing.** |  |  |  |  | **√** |  |  |  |  |  |  |  | | | | | | | | |
| **Content outline of the course / module and the SLT per topic** | | | | | | | |
| **Weeks** |  | **Topics** | | | | **Learning Hours** | **Task/Reading** |
| 1 | **Introduction** to remote sensing and telemetry, electromagnetic radiation. | | | | |  | Chapter 1 and 2 |
| 2 | **Components of remote sensing and telemetry:** Photographic sensors, analog and Digital Data, Data logger, hand-shaking, | | | | |  | Chapter 3, 4 |
| 3 | **Components of remote sensing and telemetry:** Hand-shaking, Modulator, transmitter and antenna | | | | |  | Chapter 3, 4 |
| 4 | **Components of remote sensing and telemetry:** land observation satellites, microwave and radar, FM/RF radio. | | | | |  | Chapter 3, 4 |
| 5 | **Fundamentals of telemetry systems:** Radio and wireless fundamental, Analog frequency modulation,. | | | | |  | Hand out |
| 6 | **Fundamentals of telemetry systems:** Data communication and radio telemetry System, wireless LAN system. | | | | |  | Hand out |
| 7 | **Data processing and analysis for remote sensing and telemetry:** Image processing and interpretation. Data acquisition and distribution systems, | | | | |  | Chapter 4, 5 |
| 8 | **Data processing and analysis for remote sensing and telemetry:** Multiplexing and demultiplexing, Modulation and demodulation theory | | | | |  | Chapter 4, 5 |
| 9 | **Digital Communication and Protocols**: Pulse Modulation, Pulse code modulation, Delta Modulation, Line codes,. | | | | |  | Hand Out |
| 10 | **Digital Communication and Protocols**: Time Division Multiplexing, Data Compression, Protocols: Modbus, TCP/IP protocol suite, routing, TCP/IP utilities. | | | | |  | Hand Out |
| 11 | **Telemetry design system**: Telemetry simulation using Labview, | | | | |  | Chapter 6,7 |
| 12 | **Telemetry design system**: Telemetry design, transmitter selection, antenna selection. | | | | |  | Chapter 6,7 |
| 13 | **Industrial Remote sensing and Telemetry:** Geographic information system, modern industrial applications in telemetry. | | | | |  | Chapter 8 |
| 14 | **Industrial Remote sensing and Telemetry:** Petroleum, rail road, power utility, manufacturing, instrumentation and measurement monitoring. | | | | |  | Chapter 8 |
| **Required references supporting the course** | | | | | | | |
| *The reference lists shall be presented in accordance with APA bibliographic practices and in alphabetical order.*  J. B. Cambell, *Introduction to Remote Sensing*, (2002), 3ed, The Guilford Press  F. Carden, R. P. Jedlicka, R. Henry, (2002) *Telemetry system Engineering*, Artech House. | | | | | | | |
| **Recommended references supporting the course** | | | | | | | |
| 1. D. Patranabis, (2007), *Telemetry Principles*, Tata Mcgraw Hill 2. B. A. Carley, Communication system - Introduction to signals and noise in electrical communications, Mcgraw Hill. 3. T. M. Lillesand,R. W. Kiefer, (1994) R*emote Sensing and Image Interpretation,* John Wiley and Sons Inc., New York.   . | | | | | | | |
| **Prepared by:**  **Dr Muhammad Mahbubur Rashid**  **Associate Professor**  **Kulliyyah of Engineering** | | | | **Checked by:**  **Dr. MD. Raisuddin Khan**  **Head of Department**  **Kulliyyah of Engineering** | **Approved by:**  **Dato Wira Ir Dr Mohammad Noor bin Hj Salleh**  **Dean Kulliyyah of Engineering** | | |

**Programme Learning Outcome (PO): At the end of the programme, Students are able to:**

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| --- | --- |
| **No** | **Programme Outcome for KOE, IIUM** |
| 1. | **Engineering Knowledge (T)** -Apply knowledge of mathematics, science**s**, engineering fundamentals and an engineering specialization to the solution of complex engineering problems; |
| 2. | **Problem Analysis (T)** – Identify, formulate, research relevant literature and analyze complex engineering problems, and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences; |
| 3. | **Design/Development of Solutions (A)** –Design solutions, exhibiting innovativeness, for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues. |
| 4. | **Investigation (D)** Conduct investigation into complex problems, displaying creativeness, using research-based knowledge, and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions; |
| 5. | **Modern Tool Usage (A & D) -**Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations; |
| 6. | **The Engineer and Society (ESSE)** -Apply reasoning **based on** contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices. |
| 7. | **Environment and Sustainability (ESSE)** -Understand the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development; |
| 8. | **Ethics (ESSE)** –Apply professional ethics with Islamic values and commit to responsibilities and norms of professional engineering code of practices. |
| 9. | **Communication (S)** -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; |
| 10 | **Individual and Team Work (S) -**Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings. |
| 11. | **Life Long Learning (S) -**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. |
| 12. | **Project Management and Finance (S) -**Demonstrate knowledge and understanding of engineering management and financial principles and apply these to one’s own work, as a member and/or leader in a team, to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship. |

The program learning outcomes (PO) are grouped into 5 general areas to identify the nature of the skills and capability involved. These groups are:

1. Technical (T) – essential capabilities related to traditional scientific and engineering knowledge
2. Analysis (A) – creatively working with available data and engineering tools and fundamental knowledge to correctly solve basic problem
3. Design (D) – being able to perceive the best solution for both small scale and large scale project by involving all required basic problems
4. Ethics, Safety, Society and Environment (ESSE) - giving appropriate consideration to matters pertaining to professionalism and ethics, safety, local and global society and the environment
5. Work skills (S) – being and effective communicator and effective member of a team and to appreciate the need to continuously acquired skills and abilities.