



## 63. Elective 1

# Course Specification of Introduction to Mechatronics Systems

| I. Course Identification and General Information: |  |   |            |    |     |               |
|---|--|---|------------|----|-----|---------------|
| 1.  | Course Title:  | Introduction to Mechatronics Systems.   |            |    |     |               |
| 2.  | Course Code & Number:                                  | ME327.  |            |    |     |               |
| 3.  | Credit Hours:  | C.H   |            |    |     | Total Cr. Hrs |
|   |  | Th.   | Seminar/Tu | Pr | Tr. |               |
|   |  | 2   | -          | -  | -   |               |
| 4.  | Study level/ semester at which this course is offered: | Fourth Year- First Semester.  |            |    |     |               |
| 5.  | Pre –requisite (if any):                               | Electrical Machines , Computer Programming & Applications , and Measurements and Instrumentation. |            |    |     |               |
| 6.  | Co –requisite (if any):                                | None.   |            |    |     |               |
| 7.  | Program (s) in which the course is offered:            | Mechanical Engineering Program.   |            |    |     |               |
| 8.  | Language of teaching the course:                       | English Language.   |            |    |     |               |
| 9.  | Location of teaching the course:                       | Mechanical Engineering Department.  |            |    |     |               |
| 10.   | Prepared By:   | Asst. Prof. Dr. Hatem Al-Dois   |            |    |     |               |
| 11.   | Date of Approval:                                      |   |            |    |     |               |

| II. Course Description:   |
|---|
| <p>This course provides students with an introduction to the rapidly developing, multidisciplinary field of Mechatronic by highlighting that Mechatronics is a systems approach for technology integration. The course focuses on the principal technologies that contribute towards effective implementation of such systems. Topics include process of design synthesis as an important part of engineering, actuators as the components that exert effort to accomplish a given task, sensors as the units that take measurements of the environment, and computer components - hardware and software- that are combined to allow effective control of the system.</p> |

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 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

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| III. Alignments of the Course Intended Learning Outcomes (CILOs) |  | Referenced PILOs |
|--|--|------------------|
| a1   | Describe the significance of integrating electronics and microprocessor-based systems in mechanical products and processes and illustrate the nature of technologies involved in such systems. | A1               |
| a2   | Explain the characteristics, functionality and limitations of various types of components of mechatronics systems such as actuators, sensors, and microcontrollers.                            | A2               |
| b1   | Select proper actuators, sensors, and controllers as well as control algorithms for various operating mechatronics systems and products.   | B1               |
| c1   | Practice different computer tools for the design and simulation of new and existing mechatronics systems.  | C1               |
| d1   | Review the literature to research of new trends in mechatronics technologies for various applications.   | D.4              |

| (A) Alignment Course Intended Learning Outcomes of Knowledge and Understanding to Teaching Strategies and Assessment Strategies:   |   |  |
|--|---|--|
| Course Intended Learning Outcomes  | Teaching strategies   | Assessment Strategies  |
| a1- Describe the significance of integrating electronics and microprocessor-based systems in mechanical products and processes and illustrate the nature of technologies involved in such systems. | Lectures,<br>Interactive Class<br>Discussions,<br>Exercises and<br>Home Works | Examinations,<br>Homework and<br>Assignments,<br>Presentations |
| a2- Explain the characteristics, functionality and limitations of various types of components of mechatronics systems such as actuators, sensors, and microcontrollers.                            | Lectures,<br>Presentations,<br>Interactive Class<br>Discussions               | Examinations,<br>Homework and<br>Assignments,<br>Presentations |

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 Adel Ahmed  
 Al-Shakiri

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| <b>(B) Alignment Course Intended Learning Outcomes of Intellectual Skills to Teaching Strategies and Assessment Strategies:</b>                 |   |   |
|---|---|---|
| Course Intended Learning Outcomes   | Teaching strategies   | Assessment Strategies                                 |
| <b>b1-</b> Select proper actuators, sensors, controllers as well as control algorithms for various operating mechatronics systems and products. | Lectures, Interactive Class Discussions, Directed Self- Study | Examinations, Homework and Assignments, Presentations |

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| <b>(C) Alignment Course Intended Learning Outcomes of Professional and Practical Skills to Teaching Strategies and Assessment Strategies:</b> |   |                          |
|---|---|--------------------------|
| Course Intended Learning Outcomes   | Teaching strategies                         | Assessment Strategies    |
| c1- Practice different computer tools for the design and simulation of new and existing mechatronics systems.                                 | Exercises and Homework, Directed self-study | Homework and Assignments |

| <b>(D) Alignment Course Intended Learning Outcomes of Transferable Skills to Teaching Strategies and Assessment Strategies:</b> |   |   |
|---|---|---|
| Course Intended Learning Outcomes   | Teaching strategies   | Assessment Strategies                   |
| d1- Review the literature to research of new trends in mechatronics technologies for various applications.                      | Directed Self- Study, The use of Communication and Information Technology | Homework and Assignments, Presentations |

| <b>IV. Course Content:</b>     |                       |                   |  |                 |               |
|--------------------------------|-----------------------|-------------------|--|-----------------|---------------|
| <b>A – Theoretical Aspect:</b> |                       |                   |  |                 |               |
| Order                          | Units/Topics List     | Learning Outcomes | Sub Topics List  | Number of Weeks | Contact Hours |
| 1                              | What is Mechatronics? | a1                | <ul style="list-style-type: none"> <li>– Microprocessors in Modern Engineering Systems and the Need of Integration;</li> <li>– Basic Definitions;</li> <li>– Key Elements of Mechatronics;</li> <li>– Mechatronics as A Framework for Integrating Technologies;</li> </ul> | 2               | 4             |

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|   |                                     |        |  |   |   |
|---|-------------------------------------|--------|--|---|---|
|   |                                     |        | <ul style="list-style-type: none"> <li>– Mechatronics in Products and Processes;</li> <li>– Integration of Technologies;</li> <li>– Information Flow in Mechatronic Systems</li> </ul>   |   |   |
| 2 | Introduction to Measurement Systems | a1, a2 | <ul style="list-style-type: none"> <li>– Information Input in Mechatronics Systems;</li> <li>– The Role of Measurement Systems;</li> <li>– Constituent Elements of Measurement Systems;</li> <li>– Measurement System Characteristics and Requirements Definition</li> </ul> | 1 | 2 |
| 3 | Measurement System Technologies     | a2, b1 | <ul style="list-style-type: none"> <li>– Classification of Measurement Systems;</li> <li>– Overview of Measurement Technologies with Particular Emphasis on Displacement and Force Measurement</li> </ul>  | 2 | 4 |
| 4 | Actuation Systems for Mechatronics  | a1, a2 | <ul style="list-style-type: none"> <li>– The Role of Actuation Systems in Mechatronics;</li> <li>– Constituent Elements of Actuation Systems;</li> <li>– Actuation System Characteristics, and Requirements Definition</li> </ul>  | 1 | 2 |

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|   |   |            |  |   |   |
|---|---|------------|--|---|---|
| 5 | Actuation System Technologies               | a2, b1     | <ul style="list-style-type: none"> <li>– Classification of Actuation Systems;</li> <li>– Overview of Actuation Technologies with Particular Emphasis on Fluid Power Actuation</li> </ul>   | 1 | 2 |
| 6 | Mid-Term Exam                               | a1, a2, b1 | First Five Chapters  | 1 | 2 |
| 7 | Control Approaches for Mechatronics Systems | a1, a2, b1 | <ul style="list-style-type: none"> <li>– Introduction and Review of Control Systems;</li> <li>– Insight into the Role of Control as an Information Processor in Mechatronic Systems;</li> <li>– Basic Classification of Control Technologies;</li> <li>– Overview of the Application of Programmable Logic Controllers in Mechatronic Systems</li> </ul> | 2 | 4 |
| 8 | Embedded Systems in Mechatronics            | a1, a2, b1 | <ul style="list-style-type: none"> <li>– Introduction to Embedded Systems in Mechatronics</li> <li>– Number Systems, Digital Arithmetic, Boolean Logic and Finite State Machines</li> <li>– Overview of C Programming</li> <li>– Interface Circuitry</li> <li>– Microcontroller: Physical Hardware Overview and Limitations</li> </ul>                   | 2 | 4 |

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|  |                      |                |  |           |           |
|--|----------------------|----------------|--|-----------|-----------|
|  |                      |                | – Communications   |           |           |
| 9  | Analysis of Examples | a1, a2, b1, c1 | – Exoskeleton<br>– Electric Motorbike<br>– Building Vibration Absorber<br>– Thermal Incubator<br>– Rapid Thermal Processing for Semiconductors, Ascender, Saw Stop, Electric Grid. | 3         | 6         |
| 10   | <b>Final Exam</b>    | a1, a2, b1     | All the Chapters   | 1         | 2         |
| <b>Number of Weeks /and Units Per Semester</b> |                      |                |  | <b>16</b> | <b>32</b> |

### V. Teaching Strategies of the Course:

- Lectures.
- Interactive Class Discussions.
- Exercises and Homework.
- Presentations.
- Directed Self- Study.
- The use of Communication and Information Technology.

### VI. Assignments:

| No. | Assignments   | Aligned CILOs (symbols) | Week Due | Mark |
|-----|---|-------------------------|----------|------|
| 1   | Special Purpose Actuators in Mechatronics Systems Applications                        | a2, b1, d1              | 4        | 2    |
| 2   | Smart and Intelligent Sensors for Mechatronics Systems                                | a2, b1, d1              | 6        | 2    |
| 3   | Special Purpose Microcontrollers in Mechatronics Applications                         | a2, b1, d1              | 10       | 2    |
| 4   | Prepare and Deliver Presentation of a Mechatronics Case Study from Your Own Research. | a1, a2, b1, d1          | 12       | 4    |

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 Assoc. Prof. Dr. Mohammad Algorafi

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|              |           |
|--------------|-----------|
| <b>Total</b> | <b>10</b> |
|--------------|-----------|

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 Asst. Prof. Dr.  
 Adel Ahmed  
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 Assoc. Prof. Dr.  
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| <b>VII. Schedule of Assessment Tasks for Students During the Semester:</b> |                   |              |            |                                |                                  |
|--|-------------------|--------------|------------|--------------------------------|----------------------------------|
| No.  | Assessment Method | Week Due     | Mark       | Proportion of Final Assessment | Aligned Course Learning Outcomes |
| 1  | Quizzes           | 3, 7, 11, 13 | 10         | 10%                            | a1, a2, b1                       |
| 2  | Assignments       | 4, 6, 10, 12 | 10         | 10%                            | a1, a2, b1, d1                   |
| 3  | Mid-Term Exam     | 8            | 20         | 20%                            | a1, a2, b1                       |
| 4  | Final Exam        | 14           | 60         | 60%                            | a1, a2, b1                       |
| <b>Total</b>   |                   |              | <b>100</b> | <b>100%</b>                    |                                  |

| <b>VIII. Learning Resources:</b>   |   |
|--|---|
| <ul style="list-style-type: none"> <li>Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).</li> </ul> |   |
| <b>1- Required Textbook(s) (maximum two ).</b>   |   |
|  | <ol style="list-style-type: none"> <li>Kuttan, A., 2007, Introduction to Mechatronics, Oxford, Oxford University Press.</li> <li>J. Edward Carrer, R. Matthew Ohline and Thomas W. Kenny, 2011, Introduction to Mechatronic Design, NJ, Prentice Hall.</li> </ol>   |
| <b>2- Essential References.</b>  |   |
|  | <ol style="list-style-type: none"> <li>Robert H. Bishop, 2006, Mechatronics: An Introduction, NY, CRC Press.</li> <li>David G. Alciatore and Michael B. Hstand, 2012, Introduction to Mechatronics and Measurement Systems, 4th Edition, NY, McGraw-Hill.</li> <li>William Bolton, 201, 1Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 5th Edition, Essex, England: Pearson.</li> <li>Clarence W. de Silva, 2005, Mechatronics: An Integrated Approach, NY, CRC Press.</li> <li>Clive L. Dym and Patrick Little, 2009, Engineering Design: A Project-Based Introduction, 3rd Edition, NY, John Wiley &amp; Sons.</li> <li>Klaus Pohl, 2010, Requirements Engineering: Fundamentals, Principles and Techniques, London, Springer-Verlag.</li> <li>George E. Dieter and Linda C. Schmidt, Engineering Design, 5th edition, New York, NY: McGraw-Hill, 2013.</li> </ol> |

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 Department  
 Asst. Prof. Dr.  
 Adel Ahmed  
 Al-Shakiri

Quality Assurance  
 Unit  
 Assoc. Prof. Dr.  
 Mohammad  
 Algorafi

Dean of the Faculty  
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| 3- Electronic Materials and Web Sites etc. |  |
|--|--|
|  | <ol style="list-style-type: none"> <li>1. Course outline, MECH 458, Mechatronics, Department of Mechanical Engineering, University of Victoria.<br/> <a href="http://www.me.uvic.ca/~mech458">http://www.me.uvic.ca/~mech458</a></li> <li>2. How to Mechatronics, an education website in the area of Mechanical, Electrical and Computer Engineering.<br/> <a href="https://howtomechatronics.com/">https://howtomechatronics.com/</a></li> <li>3. Introduction to Mechatronics and Measurement Systems, David G. Alciatore, Textbook information and resources, demos, texts, etc.<br/> <a href="https://mechatronics.colostate.edu/">https://mechatronics.colostate.edu/</a></li> </ol> |

| IX. Course Policies: |  |
|----------------------|--|
| 1                    | <b>Class Attendance:</b><br>The students should have more than 75 % of attendance according to rules and regulations of the Faculty.   |
| 2                    | <b>Tardy:</b><br>The students should respect the timing of attending the lectures. They should attend within 10 minutes from starting of the lecture.  |
| 3                    | <b>Exam Attendance/Punctuality:</b><br>The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for mid-term exam and final exam. |
| 4                    | <b>Assignments &amp; Projects:</b><br>The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.  |
| 5                    | <b>Cheating:</b><br>If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for <b>enquiries</b> .                              |
| 6                    | <b>Plagiarism:</b><br>The student will be terminated from the Faculty, if one student attend the exam on another behalf according to the policy, rules and regulations of the university.                    |
| 7                    | <b>Other policies:</b> <ul style="list-style-type: none"> <li>• All the teaching materials should be kept out the examination hall.</li> <li>• The mobile phone is not allowed.</li> </ul>                   |

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 Asst. Prof. Dr.  
 Adel Ahmed  
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|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>• There should be a respect between the student and his teacher.</li> </ul> |
|--|--|

|                    |   |
|--------------------|---|
| <b>Reviewed By</b> | <b><u>Vice Dean for Academic Affairs and Post Graduate Studies: Asst. Prof. Dr. Tarek A. Barakat</u></b><br><b><u>President of Quality Assurance Unit: Assoc. Prof. Dr. Mohammed Algorafi</u></b><br><b><u>Name of Reviewer from the Department: Asst. Prof. Dr. Eng. Hamoud A. Al-Nahari</u></b> |
|                    | <b><u>Deputy Rector for Academic Affairs Asst. Prof. Dr. Ibrahim AlMutaa</u></b><br><b><u>Assoc. Prof. Dr. Ahmed Mujahed</u></b><br><b><u>Asst. Prof. Dr. Munasar Alsubri</u></b>   |

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 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

Quality Assurance Unit  
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Dean of the Faculty  
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## 63. Course Plan of Introduction to Mechatronics Systems

| I. Information about Faculty Member Responsible for the Course: |  |              |     |     |     |     |     |
|---|--|--------------|-----|-----|-----|-----|-----|
| Name of Faculty Member  | Asst. Prof. Dr. Hatem Al-Dois                            | Office Hours |     |     |     |     |     |
| Location & Telephone No.  | 774677493  | SAT          | SUN | MON | TUE | WED | THU |
| E-mail  | <a href="mailto:haldois@yahoo.com">haldois@yahoo.com</a> |              |     |     |     |     |     |

| II. Course Identification and General Information: |   |   |             |     |     |               |
|--|---|---|-------------|-----|-----|---------------|
| 1.   | Course Title:                                     | Introduction to Mechatronics Systems.   |             |     |     |               |
| 2.   | Course Number & Code:                             | ME327.  |             |     |     |               |
| 3.   | Credit Hours:                                     | C.H   |             |     |     | Total Cr. Hrs |
|  |   | Th.   | Seminar/Tu. | Pr. | Tr. |               |
|  |   | 2   | -           | -   | -   | 2             |
| 4.   | Study level/year at which this course is offered: | Fourth Year - First Semester.   |             |     |     |               |
| 5.   | Pre –requisite (if any):                          | Electrical Machines, Computer Programming & Applications, and Measurements and Instrumentation. |             |     |     |               |
| 6.   | Co –requisite (if any):                           | None.   |             |     |     |               |
| 7.   | Program (s) in which the course is offered        | Mechanical Engineering Program.   |             |     |     |               |
| 8.   | Language of teaching the course:                  | English Language.   |             |     |     |               |
| 9.   | System of Study:                                  | Semesters.  |             |     |     |               |
| 10.  | Mode of delivery:                                 | Lectures.   |             |     |     |               |
| 11.  | Location of teaching the course:                  | Mechanical Engineering Department.  |             |     |     |               |

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### III. Course Description:

This course provides students with an introduction to the rapidly developing, multidisciplinary field of Mechatronic by highlighting that Mechatronics is a systems approach for technology integration. The course focuses on the principal technologies that contribute towards effective implementation of such systems. Contents include process of design synthesis as an important part of engineering, actuators as the components that exert effort to accomplish a given task, sensors as the units that take measurements of the environment, and computer components - hardware and software- that are combined to allow effective control of the system.

### IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:

This course aims to:

1. Provide students with an appreciation of the principles of Mechatronics and what constitutes a Mechatronic System .
2. Provide students with the opportunity to realize the application of the constituent technological elements in Mechatronics, namely, measurement systems, actuation systems and control systems.
3. Allow students to learn the design and analyze principles in mechatronics systems using mechanical, electronics, and computer hardware and software.
4. Help students to integrate microcontroller technologies in Mechatronic systems.

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 Asst. Prof. Dr.  
 Adel Ahmed  
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| <b>V. Course Content:</b>   |                                     |   |                                   |                      |
|---|-------------------------------------|---|-----------------------------------|----------------------|
| <ul style="list-style-type: none"> <li>Distribution of Semester Weekly Plan of Course Topics/Items and Activities.</li> </ul> |                                     |   |                                   |                      |
| <b>A – Theoretical Aspect:</b>  |                                     |   |                                   |                      |
| <b>Order</b>  | <b>Topics List</b>                  | <b>Sub Topics List</b>  | <b>Week Due</b>                   | <b>Contact Hours</b> |
| 1   | What is Mechatronics?               | <ul style="list-style-type: none"> <li>Microprocessors in modern engineering systems and the need of integration;</li> <li>Basic definitions;</li> <li>Key elements of Mechatronics;</li> <li>Mechatronics as a framework for integrating technologies;</li> <li>Mechatronics in products and processes;</li> <li>Integration of Technologies;</li> <li>Information flow in Mechatronic Systems;</li> </ul> | 1 <sup>st</sup> , 2 <sup>nd</sup> | 4                    |
| 2   | Introduction to Measurement Systems | <ul style="list-style-type: none"> <li>Information input in Mechatronics Systems;</li> <li>The role of measurement systems;</li> <li>Constituent elements of measurement systems;</li> <li>Measurement system characteristics and requirements definition</li> </ul>  | 3 <sup>rd</sup>                   | 2                    |
| 3   | Measurement System Technologies     | <ul style="list-style-type: none"> <li>Classification of measurement systems;</li> <li>Overview of measurement technologies with particular emphasis on displacement and force measurement</li> </ul>   | 4 <sup>th</sup> , 5 <sup>th</sup> | 4                    |

Head of Department  
 Asst. Prof. Dr. Adel Ahmed Al-Shakiri

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|   |   |  |                                     |   |
|---|---|--|-------------------------------------|---|
| 4 | Actuation Systems for Mechatronics          | <ul style="list-style-type: none"> <li>– The role of actuation systems in Mechatronics;</li> <li>– Constituent elements of actuation systems;</li> <li>– Actuation system characteristics, and requirements definition</li> </ul>  | 6 <sup>th</sup>                     | 2 |
| 5 | Actuation System Technologies               | <ul style="list-style-type: none"> <li>– Classification of Actuation Systems;</li> <li>– Overview of actuation technologies with particular emphasis on fluid power actuation</li> </ul>   | 7 <sup>th</sup>                     | 2 |
| 6 | Mid-Term Exam                               | First Five Chapters  | 8 <sup>th</sup>                     | 2 |
| 7 | Control Approaches for Mechatronics Systems | <ul style="list-style-type: none"> <li>– Introduction and Review of Control Systems;</li> <li>– Insight into the role of control as an information processor in mechatronic systems;</li> <li>– Basic classification of control technologies;</li> <li>– Overview of the application of Programmable Logic Controllers in Mechatronic Systems</li> </ul>         | 9 <sup>th</sup> , 10 <sup>th</sup>  | 4 |
| 8 | Embedded Systems in Mechatronics            | <ul style="list-style-type: none"> <li>– Introduction to embedded systems in mechatronics</li> <li>– Number systems, digital arithmetic, Boolean logic and finite state machines</li> <li>– Overview of C programming</li> <li>– Interface circuitry</li> <li>– Microcontroller: physical hardware overview and limitations</li> <li>– Communications</li> </ul> | 11 <sup>th</sup> , 12 <sup>th</sup> | 4 |

Head of Department  
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 Prof. Dr. Mohammed AL-Bukhaiti

Academic Development Center & Quality Assurance  
 Assoc. Prof. Dr. Huda Al-Emad

Rector of Sana'a University  
 Prof. Dr. Al-Qassim Mohammed Abbas



|  |                      |  |   |           |
|--|----------------------|--|---|-----------|
| 9  | Analysis of Examples | <ul style="list-style-type: none"> <li>- Exoskeleton</li> <li>- Electric Motorbike</li> <li>- Building Vibration Absorber</li> <li>- Thermal Incubator</li> <li>- Rapid Thermal Processing for Semiconductors, Ascender, Saw stop, Electric Grid.</li> </ul> | 13 <sup>th</sup> ,<br>14 <sup>th</sup> , 15 <sup>th</sup> | 6         |
| 10   | Final Exam           | The All Chapters   | 16 <sup>th</sup>  | 2         |
| <b>Number of Weeks /and Units Per Semester</b> |                      |  | <b>16</b>   | <b>32</b> |

### VI. Teaching Strategies of the Course:

- Lectures.
- Interactive Class Discussions.
- Exercises and **Homework**.
- Presentations.
- Directed Self- Study.
- The Use of Communication and Information Technology.

### VII. Assignments:

| No. | Assignments   | Week Due | Mark |
|-----|---|----------|------|
| 1   | Special Purpose Actuators in Mechatronics Systems Applications                        | 4        | 2    |
| 2   | Smart and Intelligent Sensors for Mechatronics Systems                                | 6        | 2    |
| 3   | Special Purpose Microcontrollers in Mechatronics Applications                         | 10       | 2    |
| 4   | Prepare and Deliver Presentation of a Mechatronics Case Study from Your Own Research. | 12       | 4    |

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|              |           |
|--------------|-----------|
| <b>Total</b> | <b>10</b> |
|--------------|-----------|

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| <b>VIII. Schedule of Assessment Tasks for Students During the Semester:</b> |                                 |                 |             |                                       |
|---|---------------------------------|-----------------|-------------|---------------------------------------|
| <b>Assessment</b>   | <b>Type of Assessment Tasks</b> | <b>Week Due</b> | <b>Mark</b> | <b>Proportion of Final Assessment</b> |
| 1   | Quizzes                         | 3, 7, 11, 13    | 10          | 10%                                   |
| 2   | Assignments                     | 4, 6, 10, 12    | 10          | 10%                                   |
| 3   | Mid-Term Exam                   | 8               | 20          | 20%                                   |
| 4   | Final Exam                      | 14              | 60          | 60%                                   |
| <b>Total</b>  |                                 |                 | <b>100</b>  | <b>100%</b>                           |

| <b>IX. Learning Resources:</b>   |   |
|--|---|
| <ul style="list-style-type: none"> <li>Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).</li> </ul> |   |
| <b>1- Required Textbook(s) (maximum two ).</b>   |   |
|  | <ol style="list-style-type: none"> <li>Kuttan, A., 2007, Introduction to Mechatronics, Oxford, Oxford University Press.</li> <li>J. Edward Carrer, R. Matthew Ohline and Thomas W. Kenny, 2011, Introduction to Mechatronic Design, NJ, Prentice Hall.</li> </ol>   |
| <b>2- Essential References.</b>  |   |
|  | <ol style="list-style-type: none"> <li>Robert H. Bishop, 2006, Mechatronics: An Introduction, NY, CRC Press.</li> <li>David G. Alciatore and Michael B. Hstand, 2012, Introduction to Mechatronics and Measurement Systems, 4th Edition, NY, McGraw-Hill.</li> <li>William Bolton, 201, 1Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, 5th Edition, Essex, England: Pearson.</li> <li>Clarence W. de Silva, 2005, Mechatronics: An Integrated Approach, NY, CRC Press.</li> <li>Clive L. Dym and Patrick Little, 2009, Engineering Design: A Project-Based Introduction, 3rd Edition, NY, John Wiley &amp; Sons.</li> <li>Klaus Pohl, 2010, Requirements Engineering: Fundamentals, Principles and Techniques, London, Springer-Verlag.</li> <li>George E. Dieter and Linda C. Schmidt, Engineering Design, 5th edition, New York, NY: McGraw-Hill, 2013.</li> </ol> |

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| 3- Electronic Materials and Web Sites etc. |  |
|--|--|
|  | <ol style="list-style-type: none"> <li>1. Course outline, MECH 458, Mechatronics, Department of Mechanical Engineering, University of Victoria.<br/> <a href="http://www.me.uvic.ca/~mech458">http://www.me.uvic.ca/~mech458</a></li> <li>2. How to Mechatronics, an education website in the area of Mechanical, Electrical and Computer Engineering.<br/> <a href="https://howtomechatronics.com/">https://howtomechatronics.com/</a></li> <li>3. Introduction to Mechatronics and Measurement Systems, David G. Alciatore, Textbook information and resources, demos, texts, etc.<br/> <a href="https://mechatronics.colostate.edu/">https://mechatronics.colostate.edu/</a></li> </ol> |

| X. Course Policies: |   |
|---------------------|---|
|                     | <b>Class Attendance:</b>  |
| 1                   | The students should have more than 75 % of attendance according to rules and regulations of the Faculty.  |
|                     | <b>Tardy:</b>   |
| 2                   | The students should respect the timing of attending the lectures. They should attend within 10 minutes from starting of the lecture.                                  |
|                     | <b>Exam Attendance/Punctuality:</b>   |
| 3                   | The student should attend the exam on time. The punctuality should be implemented according to rules and regulations of the faculty for mid-term exam and final exam. |
|                     | <b>Assignments &amp; Projects:</b>  |
| 4                   | The assignment is given to the students after each chapter, the student has to submit all the assignments for checking on time.                                       |
|                     | <b>Cheating:</b>  |
| 5                   | If any cheating occurred during the examination, the student is not allowed to continue and he has to face the examination committee for <b>enquiries</b> .           |
|                     | <b>Plagiarism:</b>  |
| 6                   | The student will be terminated from the Faculty, if one student attend the exam on another behalf according to the policy, rules and regulations of the university.   |
| 7                   | <b>Other policies:</b>  |

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|  | <ul style="list-style-type: none"> <li>• All the teaching materials should be kept out the examination hall.</li> <li>• The mobile phone is not allowed.</li> <li>• There should be a respect between the student and his teacher.</li> </ul> |
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