## Comparison between Current Course Objectives and Proposed Course Objectives for *MIME4140 – CAD/CAM*

| **Course Objectives for *MIME4140* (current)** | **Proposed Course Objectives for *MIME4140*** |
|---|---|
| This course should enable the student to :<br>1. Understand the concept of wireframe and surface modeling.<br>2. Grasp the concept of making, editing, 3D models using primitives.<br>3. Understand the concepts of shading and rendering.<br>4. Understand the principle and the type of numerical control.<br>5. Understand NG code and CNC programming.<br>6. Appreciate the application of CM in NC programming | This course should enable the student to:<br>1. Understand the concept of wireframe and surface modeling.<br>2. Grasp the concept of making, editing, 3D models using primitives.<br>3. Understand the concepts of shading and rendering.<br>4. Understand the principle and the type of numerical control.<br>5. Understand NG code and CNC programming.<br>6. Appreciate the application of CM in NC programming<br>7.Understand Rapid Prototyping Techniques<br>8.Understand concepts of Flexible Manufacturing Systems |

**Justification / Feedback:**

1. Rapid Prototyping Techniques are the advanced manufacturing techniques and it should be included in the course as it plays vital role in modern manufacturing
2. Flexible Manufacturing systems is advanced manufacturing topic and it should be part of the course objective

## Comparison between Current Outcomes and Proposed Outcomes for

## *MIME4140 – CAD/CAM*

| **Course Learning Outcomes for *MIME4140* (current)** | **Proposed Course Learning outcomes for *MIME4140*** |
|---|---|
| A student who satisfactorily complete the course should be able to:<br>1. Define surface modeling and wireframe modeling<br>2. Create simple models in 2D/3D and edit it if required.<br>3. Appreciate the importance of Optimization. | A student who satisfactorily complete the course should be able to:<br>1. Define surface modeling and wireframe modeling<br>2. Create simple models in 2D/3D and edit it if required.<br>3. Appreciate the importance of Optimization. |

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|---|---|---|
| | 4. Making 3D model using primitives.<br>5. Learn methods of viewing 3D model from direction.<br>6. Appreciate the importance of NC machining and its type<br>7. Apply the CM in NC Programming.<br>8. Apply NG code for operations as turning, profile milling.<br>9. Apply assembly modeling using concurrent technique. | 4. Making 3D model using primitives.<br><br>5. Learn methods of viewing 3D model from direction.<br>6. Appreciate the importance of NC machining and its type<br>7. Apply the CM in NC Programming.<br>8. Apply NG code for operations as turning, profile milling.<br>9. Apply assembly modeling using concurrent technique<br>10 Rapid Prototyping Techniques<br>11.Introduction to Flexible Manufacturing System |

**Justification / Feedback:**

1. Rapid prototyping Techniques and Flexible manufacturing system are the major components to be included as they are the current trends in modern manufacturing

## Map of Proposed Outcomes vs. Weeks

| Proposed Outcomes | Week number |
|---|---|
| 1. | 1 |
| 2. | 2 |
| 3. | 3 |
| 4. | 4,5 |
| 5. | 6 |
| 6 | 7 |
| 7 | 8 |
| 8 | 9.10 |
| 9 | 11 |
| 10 | 12 |
| 11 | 13 |

| MIME 4123 | Mechanics of Machines II | 3 Credit Hours |
|---|---|---|
| **Prerequisite** | **MIME 3220** | |
| **Goal** | To provide the students with the basic principles of mechanics of machines and the application to machines elements and systems | |

| Objectives | Outcomes |
|---|---|
| The course should enable the student to:<br>1. Study different types of gears and gear trains.<br>2. Understand the basic theory of a brake and a clutch.<br>3. Learn about the mechanics of control mechanisms such as Gyroscopes and governors.<br>4. Comprehend the fundamental theory of vibration. | Upon completion, the student should be able to:<br>1. Select the appropriate gear type for a given task.<br>2. Deal with power transmission through gear trains, clutches, and brakes etc.<br>3. Analyse and design the flywheel.<br>4. Be acquainted with the construction, operation and applications of gyroscopes in controlling the motion and direction of ships, aircrafts, etc.<br>5. Be familiar with the construction, operation and applications of governors in controlling the speed of machines such as turbo generators etc.<br>6. Evaluate the behaviour of a machines system.<br>7. Analyse the mechanical vibration behaviour of machines and choose proper vibration isolators<br>8. Perform practical work on different types of gear, gear trains.<br>9. Carry out experiments on gyroscopes and governors.<br>10. Carry out Laboratory experiments involving the transmission of vibration of machines, whirling of shafts, and other related topics. |

| MIIE 4142 | Industrial Management | 3 Credit Hours |
|---|---|---|
| Prerequisites: | MIIE 3240 | |
| Goal | To introduce the student the concept and the practice of industrial management and engineering economics. | |

## Objectives

The course should enable the student to:

1. Understand basic concept of industrial management.
2. Grasp management theory.
3. Appreciate the role and the type of organization.
4. Conceive how mangers function in industrial environment.
5. Understand manufacturing economic and finance

## Outcomes

The students should be able to:

1. Define basic element of industrial management
2. Read & analyze case studies and draw conclusion on industrial management issues.
3. Design and analyze a real life projects with problem solving strategies.
4. Identify different organization structure and differentiate between them.
5. List and analyze the type of function preformed by successful mangers.
6. Evaluate market situation and apply investment methods.
7. Define cash flow , evaluate opportunities and risks in economic

| MATH 4130 | Probability & Statistics | 3 Credit Hours |
|---|---|---|
| Prerequisite | MATH 3120 | |
| Goal | To provide the student with the basic knowledge of probability and statistics, along with practical applications to physical and engineering problems. | |

## Objectives

This course should enable the student to:

1. Understand the essential laws and principles governing the topics of probability and statistics.
2. Grasp the basic concepts and ideas involved in probability and statistics.
3. Conceive how to apply statistical methods and probability theory in practical situations.
4. Possess the mathematical skills to link probabilistic and statistical concepts in dealing with a technical problem.

## Outcomes

A student who satisfactory complete the course should be able to:

1. Demonstrate knowledge of the role of statistics in engineering applications.
2. Determine the descriptive measures (mean, median, variance…etc.) of random variables and collected data.
3. Accurately estimate population characteristics from small sample groups.
4. Evaluate sample data to determine if process interventions are truly effective or to compare various system options before making final decisions.
5. Recognize types of data and describe the data using tabular, graphical, and numerical representation.
6. Utilize the predictive power of probability distributions to project process performance in advance.
7. Graphically represent discrete and continuous random variables with probability distribution function according to their use in random processes.
8. Integrate knowledge of normal, Binomial exponential, Poisson, and Weibull distribution in a coherent and meaningful manner to engineering processes.
9. Demonstrate knowledge of the fundamental concepts of reliability and its formulae.
10. Apply reliability concepts through Exponential and Weibull distributions for lifetime expectation of engineering products.
11. Solve regression and correlation problems.
12. Apply numerical analysis to the solution of linear equations, non-

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|---|---|
| | linear equations, and LAPLACE'S equation.<br>13. Utilize a statistical analysis software. |

| MIME 4120 | Thermodynamics II | 3 Credit Hours |
|---|---|---|
| Prerequisite | MIME 3110 | |
| Goal | To expose the student to further concept and practical application of thermodynamics | |

## Objectives

The course should enable the student to:

1. Understand the basic concept and essential thermodynamics relations.
2. Model and analyze thermodynamically problems encountered in various engineering situations.
3. Acquaint with the use of an equation – solving computer engine appropriate for thermodynamics problem solving.
4. Conceive the significance of energy conversion and conservation in dealing with a problem related to thermodynamics

## Outcomes

The students should be able to:

1. Differentiate between ideal and real gases and their equations of state.
2. Analyze properly in terms of irreversibility and availability
3. Deal with vapour power cycles such as Carnot and Rakine cycle.
4. Treat gas power cycle such as gas turbine petrol and diesel engine cycles.
5. Describe the operation of rotary expander and compressors.
6. Realize basic compressions cycle and the action of reciprocating compressors.
7. Apprehend the principle of refrigeration and be familiar with P-H and T-S diagrams.
8. Aware of thermodynamics relations involved in Maxwell's equations.
9. Deal with reacting and non reacting mixtures
10. Comprehend internal combustion engine of two &four stroke cycles.
11. Realize the relations involving internal energy enthalpy and entropy.
12. Perform laboratory experiments on compressors, refrigeration and cooling tower.

| MIME 4220 | **Power Plant Engineering** | 3 Credit Hours |
|---|---|---|
| Prerequisite | MIME 4120 | |
| Co requisites | MIME 4212 | |
| Goals | To highlight the application of engineering principles to the design and analysis of power-production systems. Fossil fuel, steam and gas-turbine power plants, Alternative power generation. Environmental aspects. | |

| Objectives | Outcomes |
|---|---|
| This course should enable the student to;<br><br>1. Apply the principles of thermodynamic analysis to Rankine Cycle and Brayton Cycle power plants<br>2. Learn fundamental combustion analysis<br>3. Grasp the principles behind the basic hardware in power plants<br>4. Consider the environmental and economic factors behind different power generating techniques<br>5. Be acquainted with modern power generation techniques. | After completion of the course the students are expected to be able to:<br>1. Comprehend the energy resources and energy conversion methods available for the production of electric power in Oman and the world.<br>2. Determine the efficiency and output of a modern Rankine cycle steam power plant from given data, including superheat, reheat, regeneration, and irreversibilities.<br>3. Calculate the heat rate, fan power consumption, flame temperature and combustion air requirements of conventional steam generators (boilers).<br>4. Select the tube requirement for condensers and feed water heaters.<br>5. Explain the blade shapes, and calculate work output of typical turbine stages.<br>6. Calculate the performance of gas turbines with reheat and regeneration, and discuss the performance of combined cycle power plants.<br>7. Explain the major types of hydro-power and wind-power turbines and estimate power generation potential.<br>8. Comprehend the power generation from renewable and alternate fuels and heat sources: biofuels, synthetic fuels, geothermal, ocean thermal, solar thermal power plants.<br>9. Comprehend the potential of direct-electric power conversion systems, such as solar photovoltaic, thermionic, and fuel-cell devices.<br>10. Describe the methods of control of major pollutants from fossil-fuel power plants.<br>11. Comprehend the environmental impact of electric power production on air quality, climate change, waterways, and land use.<br>12. Perform the preliminary design of the major components or systems of a conventional or alternate power plant.<br>13. Perform laboratory experiments on single stage compressors and single and two stage gas turbines. |

| MIME 4212 | Heat Transfer | 3 Credit Hours |
|---|---|---|
| Prerequisites: | MIME 4120 | |
| Goal | To introduce the student to the basic modes of heat transfer and the practical application | |

## Objectives

The course should enable the student to:

1. Understand the basic law of heat transfer.
2. Conceive the energy balance in any thermal practical situation involving heat transfer mechanisms.
3. Grasp a systematic approach in solving heat transfer problems.
4. Determine heat transfer rates and temperature distribution in basic practical systems.
5. Extend the principles of heat transfer to engineering product and process design and product development

## Outcomes

The students should be able to:

1. Apply the three basic laws of heat transfer namely: Fourier's law of heat conduction, Newton law of cooling and Stephan –Boltzman law of radiation.
2. Realize the importance of the first law thermodynamics in solving thermal problems involving modes of heat transfer.
3. Characterize both qualitatively and quantitatively the heat flows in variety of physical and chemical situation.
4. Perform laboratory experiments involving thermal conduction, convection and radiation.
5. Recognize suitable instrumentation and use it to gather and interpret experimental data from common measurements in thermal flows and transfers
6. Deal with thermal problems involving combined modes of heat transfer.
7. Discriminate black body and grey body radiation and acquaintance with kirchoff's identity.
8. Define laminar and turbulent boundary layers and ability to formulate energy equation in flow systems.
9. Treat lumped heat capacity model for transient heat transfer

| MIEE 4210 | Control Engineering | 3 Credit Hours |
|---|---|---|
| Prerequisite | MIEE 2210 | |
| Goal | To provide the student with the basic understanding of the control theories and systems. | |

## Objectives

This course will prepare students who are able to:

1. Understand the theory of control system such as open –loop, closed loop, feedback, and block diagrams.
2. Appreciate modeling and analyzing physical systems using lap lace transforms, linear systems, and transfer functions.
3. Perceive the basic concept in transient response and their application.
4. Identify commonly used transducers and actuators in control system.
5. Realize the importance of system accuracy study.
6. Comprehend methods used in control such as root locus method, frequency response method and their application.
7. Learn basic mathematical and computational tools for modeling and analyzing of dynamic systems.

## Outcomes

The students should be able to:

1. Apply the principle of open and closed loop to real life situation.
2. Use lap lace transform, linear systems, to model physical system.
3. Identify, model analyze, and simulate dynamics systems in various engineering systems using a unified approach.
4. Simulate the transient and steady state response of systems.
5. Design basic control compensation using time and frequency domain.
6. Perform laboratory experiments on open – closed loop and reports in its outcomes.
7. Apply a system accuracy and stability on a system and comment on the outcomes
8. Use locus and frequency response methods in establishing a control system.

| MIME 4222 | Engineering design II | 3 Credit Hours |
|---|---|---|
| Prerequisites: | MIME 3221 | |
| Goal | To further expose the student to system design. | |

## Objectives

The course should enable the student to:

1. Comprehend applications of component design.
2. Perceived the principles of a project on a system design.
3. Understand product design methods.
4. Grasp the impact of human values in design.

## Outcomes

The students should be able to:

1. Design wire ropes, shaves and rum, brakes and clutches.
2. Select and classify appropriate motor components.
3. Perform motors power calculation.
4. Realize the importance of synthesis of components.
5. Apply a complete system design project using calculation, specification and drawings.
6. Define product design and relate it to human values in design
7. Use product development process and strategies in product design.
8. Apply techniques of parametric, variation, hybrid in engineering design.
9. Integrate engineering biology in design.
10. Apply in depth design knowledge in various disciplines

| MIME 4251 | B.Tech. Project I | 3 Credit Hours |
|---|---|---|
| Prerequisite | MIME 3350 | |
| Goal | To expose each student to the situation where he/she works individually or on a team in a project in the field of mechanical engineering | |

| Objectives | Outcomes |
|---|---|
| The course should enable the student to:<br>1. Integrate the various areas of knowledge he/she gained through the program<br>2. Consolidate personal confidence in working independently or an a team and improve his/her spirit of performance | The students should be able to:<br>1. Apply the knowledge he/she gained through the program into an integrated project<br>2. Demonstrate communication effectiveness through oral presentations and written reports<br>3. Present the results of work in a seminar and submit a properly written and edited final report<br>4. Manage his/her time to achieve a time-constrained target<br>5. Solve engineering problems |

**Introduction**

This project is carried out by the student during the second semester of the Bachelor of Technology program. It involves the instrumentation of the proposed design or solution in Higher Diploma Project.

| PHIL 4100 | Oman Civilization | 3 Credit Hours |
|---|---|---|
| Prerequisite | None | |
| Goal | To acquaint the student with Omani and Islamic civilization, their development and significance during different pre- and post-Islam eras, and with the Islamic judicial system. | |

| Objectives | Outcomes |
|---|---|
| The course should enable the student to:<br>1. Understand the geography of Oman<br>2. Be familiar with the significance of Omani civilization during pre- and post-Islam eras<br>3. Understand Islamic civilization, its development, and its supporting factors<br>4. Understand the Islamic judicial system during different post-Islam eras | The students should be able to:<br>1. Describe Oman's geography<br>2. Explain the effects of geography on Omani civilization<br>3. Investigate and describe the significance of Omani civilization during the pre-Islam era<br>4. Investigate and describe Oman's embracing of Islam<br>5. Investigate and describe the significance of Omani civilization during the caliphates, Ummait, and Abbasi eras<br>6. Describe the characteristics of Islamic civilization<br>7. Describe the development, and external and internal supporting factors for Islamic civilization<br>8. Describe the Islamic judicial system during the post-Islam eras |

| MIME 4351 | B.Tech. Project II | 3 Credit Hours |
|---|---|---|
| Prerequisites | MIME 4251 | |
| Goal | To further expose each student to the situation where he/she works individually or on a team in a project in the field of mechanical engineering | |

| Objectives | Outcomes |
|---|---|
| The course should enable the student to:<br>1. Integrate the various areas of knowledge he/she gained through the program<br>2. Consolidate personal confidence in working independently or an a team and improve his/her spirit of performance | The students should be able to:<br>1. Apply the knowledge he/she gained through the program into an integrated project<br>2. Demonstrate communication effectiveness through oral presentations and written reports<br>3. Present the results of work in a seminar and submit a properly written and edited final report<br>4. Manage his/her time to achieve a time-constrained target<br>5. Solve engineering problems |

**Introduction**

This project is carried out by the student during summer term of the Bachelor of Technology program. It involves the instrumentation of the proposed design or solution in B. Tech. Project I.