PRIFYSGOL glyndŵr UNIVERSITY

**MODULE SPECIFICATION FORM**

| Module Title: | **Engineering Dynamics** | Level: | **5** | Credit Value: | **10** |
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| Module code: (if known) **ENG504** | Cost Centre: **GAME** | JACS2 code: **H310** |
|---|---|---|

| Semester(s) in which to be offered: **2** | With effect from: **July 2015** |
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| ***Office use only:*** To be completed by AQSU: | Date approved: July 2015<br>Date revised:<br>Version No: 1 |
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| Existing/New: **Existing** | Title of module being replaced (if any): N/A |
|---|---|

| Originating Academic area: **Engineering and Applied Physics** | Module Leader: **Z. Chen** |
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|---|---|---|---|
| Module duration (total hours) | 100 | **Status:** core/option/elective (identify programme where appropriate): | **Free-standing 10-credit component comprising first half of ENG551 (Engineering Mechanisms and Dynamics and Engineering Design).** |
| Scheduled learning and teaching hours | 36 | | |
| Independent study hours | 64 | | |
| Placement hours | 0 | | |

| Percentage taught by Subjects other than originating Subject (please name other Subjects): | **0%** |
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| **Programme(s) in which to be offered:**<br>**Enginering European Programme** (Non Award Bearing) | Pre-requisites per programme (between levels): | **None** |
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**Module Aims:**

To develop an understanding of (i) the motion of particles without reference to the forces producing motion, (ii) the motion of rigid bodies with and without reference to the forces producing motion, (iii) the response of vibrating systems.

## Expected Learning Outcomes

Knowledge and Understanding:
At the completion of this module, the student should be able to:

1. Define, formulate and solve problems involving the rectilinear and curvlinear motion of particles and rigid bodies.
2. Analyse physical systems using concept of absolute and relative motion.
3. Analyse vibrating systems and determine the response of undamped and damped systems. *(KS 3, 10)*

Key skills for employability

1. Written, oral and media communication skills,
2. Leadership, team working and networking skills
3. Opportunity, creativity and problem solving skills
4. Information technology skills and digital literacy
5. Information management skills
6. Research skills
7. Intercultural and sustainability skills
8. Career management skills
9. Learning to learn (managing personal and professional development, self management)
10. Numeracy

## Assessment:

*Please indicate the type(s) of assessment (eg examination, oral, coursework, project) and the weighting of each (%).* ***Details of indicative assessment should also be included****.*

Assessment is by means of an examination covering outcomes 1 to 3. It is a formal unseen time-constrained written examination..
(This corresponds to 'Assessment 1' of ENG551.)

| Assessment number (use as appropriate) | Learning Outcomes met | Type of assessment | Weighting | Duration (if exam) | Word count (if coursework) |
|---|---|---|---|---|---|
| Assessment One: | 1, 2, 3 | Examination | 100% | 2 hrs | |

## Learning and Teaching Strategies:

The module will be presented to students through lectures, tutorials and practically-based work utilising laboratory equipments and workshop. Approximately one half of the time will be devoted to practical investigation, design and development. The use of computer for analysis, simulation and design is involved.

In 'Engineering Dynamics' the emphases will be on motion and dynamics analysis, problem solving, and quantitative evaluations, and students will be given case studies to complement the work in the course.

## Syllabus outline:

**Kinematics of particles:** Revision of Newton's Laws. Development of equations of motion. Rectilinear motion, including constant acceleration, acceleration as a function of time, acceleration as a function of velocity, acceleration as a function of displacement, proijectiles. Plane curvilinear motion, use of rectangular, normal and tangential, and polar coordinates,

**Analysis of Mechanisms:** Absolute motion. Relative velocity, vectorial representation, graphical solutions. Relative acceleration, analysis of practical mechanisms, graphical solutions. Motion relative to rotating axes, analysis of mechanisms, use of graphical solutions. Coridis effect. Forces and torque in various systems.

**Elements of Vibration Analysis:** Simple harmonic motion. Free undamped vibration of single degree of freedom systems. Free damped vibration of single degree of freedom systems. Forced vibration of undamped and damped single degree of freedom systems.

## Bibliography


*Essential Reading*:
Hibbeler, R.C. (2011) *Engineering Mechanics: Dynamics*, 13th Edn., Prentice-Hall.
Cross, N. (2008) *Engineering Design Methods: Strategies for Product Design*, 4th Edn., Wiley-Blackwell.

*Recommended Reading*:
*Engineering Dynamics: A Comprehensive Introduction*, Princeton University Press.
Meriam, J.L. & Kraige, L.G. (2007) *Solving Dynamics Problems in MATLAB: with Engineering Mechanics Dynamics*; 6th Edn., John Wiley & Sons.