



UNIVERSITI TEKNOLOGI MARA

CMT670: RADIOISOTOPE APPLICATIONS AND SAFETY IN INDUSTRIES

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| Course Name (English) | RADIOISOTOPE APPLICATIONS AND SAFETY IN INDUSTRIES APPROVED |
| Course Code | CMT670 |
| MQF Credit | 3 |
| Course Description | This subject is a study of the basic knowledge on the ionizing radiation originating from natural sources and man made, the nature of radiation, radiation interaction with matters, biological impact, safety and radiological protection procedures, and method of measurement. It is also deals with radiation application in various types of industries including NDT and radiography, NORM industries, nuclear technology applications and nuclear medicine. The safety aspect is governed by the Malaysian law and its regulations. |
| Transferable Skills | Responsibility Motivate others Assess and evaluate their own work Assess and evaluate others' work |
| Teaching Methodologies | Lectures, Field Trip, Discussion |
| CLO | CLO1 State the basic safety principles and procedures related to the use of ionizing radiation CLO2 Apply the knowledge and skills to scientific problems focusing on related industries CLO3 Discuss the technical solutions to realistic problems in the related industries |
| Pre-Requisite Courses | No course recommendations |
| Topics | |
| 1. 1.0 Basic concepts, sources and measurement 1.1) 1.1 Introduction to radiation and radioactivity Stability of atomic nuclei 1.2) 1.2 Radioactive decay Properties of nuclear radiation 1.3) 1.3 Sources of radiation Interaction of radiation with matters 1.4) 1.4 Unit of measurement Detection and measurement | |
| 2. 2.0 Biological Impact and Principle of Radiation Protection 2.1) 2.1 Biological impact of ionizing radiation ,Radiation dose, deterministic and stochastic effects 2.2) 2.2 Radio-logical protection Principle of radiation protection 2.3) 2.3 Instrumentation and method of monitoring 2.4) 2.4 Personnel monitoring and Radiation protection program 2.5) 2.5 Rules and regulations regarding ionizing radiation in Malaysia and worldwide | |
| 3. 3.0 Non destructive testing (NDT) and Industrial radiography 3.1) 3.1 Non destructive testing techniques 3.2) 3.2 Industrial radiography techniques 3.3) 3.3 X-ray industry | |
| 4. 4.0 Radiation Applications in Non-nuclear Power Industries 4.1) 4.1 Radiation Application in sterilization and food preservation 4.2) 4.2 Radiation application in polymer industries 4.3) 4.3 Nuclear gauging | |
| 5. 5.0 Exposure to NORMs in industries 5.1) 5.1 Industries processing naturally radioactive raw materials 5.2) 5.2 Energy production Coal power plant 5.3) 5.3 Petroleum and Minerals industries | |

6. 6.0 Nuclear Medicine

6.1) 6.1 Radioisotope production and use in medical field

6.2) 6.2 BNCT

| Assessment Breakdown | % |
|-----------------------|--------|
| Continuous Assessment | 60.00% |
| Final Assessment | 40.00% |

| Details of Continuous Assessment | Assessment Type | Assessment Description | % of Total Mark | CLO |
|----------------------------------|-----------------|------------------------|-----------------|------|
| | Assignment | One written assignment | 20% | CLO3 |
| | Test | Cover chapter 3-4 | 20% | CLO1 |
| | Test | Cover Chapter 1-2 | 20% | CLO1 |

| Reading List | Recommended Text | <ul style="list-style-type: none"> Cooper, J. R.; Randle, K.; Sokhi, R. S. 2003, <i>Radioactive releases in the environment: impact and assessment.</i>, John Wiley & Sons Ltd Chichester [ISBN: 0-471-89924] |
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| | Reference Book Resources | <ul style="list-style-type: none"> Abdul Khalik et. al. 2002, <i>Perlindungan Sinaran</i>, 1st Ed., MINT Bangi [ISBN: ISBN 967-9970] Ronald Arthur Faires, G. G. J. Boswell 1981, <i>Radioisotope laboratory techniques</i>, 4th Ed., Butterworth-Heinemann [ISBN: 9780408709408] Choppin G. R and Rydberg J. 1980, <i>Nuclear Chemistry-Theory and Applications</i>, 1st Ed., Pergamon Press Oxford [ISBN: 978-008023823] |

| Article/Paper List | This Course does not have any article/paper resources |
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| Other References | <ul style="list-style-type: none"> Book Friedlander G, Kennedy J. W., Macias E. S. and Miller J. M. 1981, <i>Nuclear and Radiochemistry</i>, John Wiley and Sons, New York |
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