



UNIVERSITI TEKNOLOGI MARA

CID411: CERAMIC PRODUCTION TECHNOLOGY

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| Course Name (English) | CERAMIC PRODUCTION TECHNOLOGY APPROVED |
| Course Code | CID411 |
| MQF Credit | 3 |
| Course Description | This course will include the basic knowledge of ceramic materials and manufacturing. It begins with two major processes, which are beneficiary and manufacturing. The beneficiary process will cover the origin of ceramic materials while the manufacturing process will discuss the basic and advanced production of ceramics. The design will be part of manufacturing main process. Hence, the role of ceramic designer in the manufacturing process is crucial to produce the best yet the most cost-effective products. |
| Transferable Skills | Research skill. |
| Teaching Methodologies | Blended Learning, Lab Work, Tutorial, Discussion, Presentation, Workshop |
| CLO | CLO1 To inquire the knowledge on ceramic materials. CLO2 To follow the gained knowledge in ceramic materials for manufacturing process. CLO3 To distinguish between solutions in ceramic manufacturing problems. |
| Pre-Requisite Courses | No course recommendations |
| Topics | |
| 1. Introduction to ceramics as materials. 1.1) Explanations of various material groups. 1.2) Ceramics definitions and categories. 1.3) Ceramics in art and design. | |
| 2. Ceramic process in manufacturing scales. 2.1) Beneficiation process of raw materials. 2.2) ? Introduction to basic geology and mineralogy (igneous, sedimentary and metamorphic rocks). 2.3) ? Types of ceramic raw materials such as clays, fluxes and fillers. 2.4) Ceramic fabrications to final products. 2.5) ? Design, forming, drying, firing (bisque and glazed). 2.6) ? Basic packaging. | |
| 3. Ceramic materials properties. 3.1) Physical and mechanical properties 3.2) ? Strength, hardness, plasticity, density, viscosity, shrinkage. 3.3) Optical properties | |
| 4. Testing and analysis 4.1) Slip and plastic clay 4.2) ? Viscosity, specific gravity/density 4.3) ? Percentage of shrinkage 4.4) Effect of binder type and amount on the green strength. 4.5) Effect of additives on the rheological properties of oxide ceramic slurries. 4.6) Effect of milling time on the surface area and phase transformation of ceramic materials 4.7) Determination of particle size and particle size distribution | |
| 5. Ceramic bodies formulation 5.1) Types of ceramics body. 5.2) ? Stoneware, earthenware, stoneware and porcelain. | |

6. Ceramic fabrications

- 6.1) Wet methods
- 6.2) ? Slip castings, plastic forming and extrusion
- 6.3) Dry methods
- 6.4) ? Ram process, injection moulding and hot iso-static pressing

7. Firing and glazing process

- 7.1) Basic thermodynamics
- 7.2) Firing and sintering process
- 7.3) Types of kiln
- 7.4) Glazing theory
- 7.5) Glazing practical and firing

| Assessment Breakdown | | % | | |
|----------------------------------|---|--|-----------------|------|
| Continuous Assessment | | 100.00% | | |
| Details of Continuous Assessment | Assessment Type | Assessment Description | % of Total Mark | CLO |
| | Lab Exercise | Conducting two (2) laboratory works in groups. | 30% | CLO2 |
| | Presentation | To present the solution in groups based on given problems. | 10% | CLO3 |
| | Writing Test | Two (2) tests related to ceramics materials to knowledge. | 60% | CLO1 |
| Reading List | Recommended Text | <ul style="list-style-type: none"> • Allen Dinsdale 1986, <i>Pottery Science</i>, 1 Ed., Halsted Press [ISBN: 0470202769] • Paul Rado, Institute of Ceramics (Great Britain) 1988, <i>An introduction to the technology of pottery</i>, Pergamon [ISBN: 0080349323] • Martin Wickham, <i>Pottery science</i> [ISBN: 0273011936] • Michael Cardew 2002, <i>Pioneer Pottery</i>, A&C Black [ISBN: 0713659459] • Daniel Rhodes 2015, <i>Clay and Glazes for the Potter</i>, Ravenio Books [ISBN: 1614277990] • F. H. Norton, <i>Elements of Ceramics</i> [ISBN: 187890728X] | | |
| Article/Paper List | Recommended Article/Paper Resources | <ul style="list-style-type: none"> • R Anwar, HR Kamarun, VV Vermol, OH Hassan 2011, Marble dust incorporate in standard local ceramic body as enhancement in sanitary ware products, <i>2011 IEEE Colloquium on Humanities, Science and Engineering (CHUSER)</i>, 355 • Hiba Zouaoui & Jamel Bouaziz 2016, Physical and mechanical properties improvement of a porous clay ceramic, <i>applied Clay Science</i>, 150, 131 [ISSN: 0169-1317] https://doi.org/10.1016/j.clay.2017.09.002 | | |
| Other References | This Course does not have any other resources | | | |