

**DEREE COLLEGE SYLLABUS FOR: BMS 4330 HEALTH INFORMATION SYSTEMS AND TECHNOLOGY****UK LEVEL: 6  
UK CREDITS: 15  
US CREDITS: 3/0/3**

(Updated Fall 2022 )

**PREREQUISITES:**MA 1008 College Algebra  
MA 2130 Calculus I  
MA 2025 Applied Statistics for Sciences**CATALOG DESCRIPTION:**

The course provides an overview of Health Information Technology, Health Informatics and Biomedical Informatics. The student is introduced to the concepts of the discipline, models, and systems including the major areas of the evolving discipline. The course focuses on the application of health information technology for healthcare delivery, education and research as well as the multidisciplinary nature of informatics.

**RATIONALE:**

The course provides students with a systems framework for understanding, bioinformatics, biomedical and healthcare informatics. The course focuses on the applications of health information technology for healthcare delivery, education and research as well as the multidisciplinary nature of informatics. The knowledge and skills presented in this course will help students progress to other more advanced or specialized courses since an understanding of health care, health information technology and recent governmental efforts is necessary in order to function in the health and biomedical informatics discipline.

**LEARNING OUTCOMES:**

- As a result of taking this course, the student should be able to:
1. Describe the development of Health Information Technology and the emergence of Health and Biomedical Informatics as a discipline.
  2. Demonstrate knowledge and understanding of the basic elements and concepts of the discipline, models, and systems thinking of health and biomedical informatics.
  3. Develop a beginning level competency in genome and proteome bioinformatics.
  4. Analyze and critically evaluate data types obtained by high-throughput experimental platforms (R/Bioconductor platform) and the use of data, information and knowledge
  5. Explain the application of health information technology to healthcare, education and research.
  6. Critically discuss the molecular library management and virtual screening, computer assisted drug design and quantitative modelling of structure-activity relationships.
  7. Explain the clinical and healthcare information systems, biomedical imaging analysis, studying genotype-phenotype relationships and IT support systems for healthcare decision-making.

**METHOD OF TEACHING AND LEARNING:**

In congruence with the learning and teaching strategy of the college, the following tools are used:

- Class lectures, interactive learning (class discussions, group work) audiovisual presentations, model, databases, and other and practical problems solved in class.
- Exercises and primary source documents are assigned as homework, the solutions of which are reviewed in class
- Office hours: students are encouraged to make full use of the office

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|   | <p>hours of their instructor, where they can ask questions, see their exam paper, and/or go over lecture/lab material.</p> <ul style="list-style-type: none"> <li>➤ Use of a blackboard site, where instructors post lecture notes, assignment instructions, timely announcements, as well as additional resources.</li> </ul>  |  |  |    |   |    |                   |  |  |   |                 |   |
| <b>ASSESSMENT:</b>  | <p><b>Summative:</b></p> <table border="1" data-bbox="423 411 1333 1104"> <tr> <td data-bbox="423 411 1141 638"> <p><b>First Assessment</b><br/> a) Review of a scientific article or report (20%)<br/> b) Short Midterm (1hour) (20%)</p> <p>It includes the following components:<br/> a) Review of a scientific article or report<br/> b) Essays</p> </td> <td data-bbox="1141 411 1333 638" style="text-align: center; vertical-align: middle;">40</td> </tr> <tr> <td data-bbox="423 638 1141 957"> <p><b>Second Assessment</b><br/> a) Written report and oral presentation (30%)<br/> b) audio-visual or ICT product, plus essay (30%)</p> <p>It includes the following components:<br/> b) Student project on a specific topic leading to a written report and oral presentation<br/> c) health informatics or data analysis product (audio-visual or ICT product, accompanied by an essay of up to 750 words (30%))</p> </td> <td data-bbox="1141 638 1333 957" style="text-align: center; vertical-align: middle;">60</td> </tr> <tr> <td colspan="2" data-bbox="423 978 1333 1010"><b>Formative:</b></td> </tr> <tr> <td data-bbox="423 1010 1089 1073">Multiple on-line tests and short practice projects</td> <td data-bbox="1089 1010 1333 1073" style="text-align: center;">0</td> </tr> <tr> <td data-bbox="423 1073 1089 1104">essay questions</td> <td data-bbox="1089 1073 1333 1104" style="text-align: center;">0</td> </tr> </table> <p>The <b>formative MC (on-line) and written essays</b> aim to prepare students for their coursework portfolio. The midterm examination tests Learning Outcomes 1-3. The final examination tests all learning outcomes and it is comprehensive.</p> <p><i>The final grade for this module will be determined by averaging all summative assessment grades, based on the predetermined weights for each assessment. If students pass the comprehensive assessment that tests all Learning Outcomes for this module and the average grade for the module is 40 or higher, students are not required to resit any failed assessments.</i></p> |  | <p><b>First Assessment</b><br/> a) Review of a scientific article or report (20%)<br/> b) Short Midterm (1hour) (20%)</p> <p>It includes the following components:<br/> a) Review of a scientific article or report<br/> b) Essays</p> | 40 | <p><b>Second Assessment</b><br/> a) Written report and oral presentation (30%)<br/> b) audio-visual or ICT product, plus essay (30%)</p> <p>It includes the following components:<br/> b) Student project on a specific topic leading to a written report and oral presentation<br/> c) health informatics or data analysis product (audio-visual or ICT product, accompanied by an essay of up to 750 words (30%))</p> | 60 | <b>Formative:</b> |  | Multiple on-line tests and short practice projects | 0 | essay questions | 0 |
| <p><b>First Assessment</b><br/> a) Review of a scientific article or report (20%)<br/> b) Short Midterm (1hour) (20%)</p> <p>It includes the following components:<br/> a) Review of a scientific article or report<br/> b) Essays</p>  | 40  |  |  |    |   |    |                   |  |  |   |                 |   |
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| <b>Formative:</b>   |   |  |  |    |   |    |                   |  |  |   |                 |   |
| Multiple on-line tests and short practice projects  | 0   |  |  |    |   |    |                   |  |  |   |                 |   |
| essay questions   | 0   |  |  |    |   |    |                   |  |  |   |                 |   |

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| <p><b>INDICATIVE READING:</b></p> | <p><b>REQUIRED READING:</b></p> <p><b>Required Textbook:</b><br/> <b>Hoyt, R.E., Yoshihashi, A.K., &amp; Bailey, N.J. (2018). Medical informatics: A practical guide for healthcare and informatics technology professionals (7th ed.).</b><br/> Print copy: <b>ISBN 978-1-387-64241-0</b> ebook:<b>ISBN 978-1-387-812750-3</b><br/> <a href="https://www.amazon.com/Health-Informatics-Practical-Guide-Seventh/dp/1387642413">https://www.amazon.com/Health-Informatics-Practical-Guide-Seventh/dp/1387642413</a></p> <p><b>RECOMMENDED READING:</b></p> <p><i>Optional textbooks</i></p> <p><b>Shortliffe, E. H., &amp; Cimino, J. J. Biomedical Informatics: Computer Applications in Health Care and Biomedicine (Health Informatics) ISBN-13: 978-1447144731 ISBN-10: 1447144732 Edition: 4th ed. 2014.</b></p> <p><b>Gordon D. Brown, PhD, Timothy B. Patrick, &amp; Kalyan Pasupathy (2013). Health Informatics: A Systems Perspective.</b> Chicago: Health Administration Press.</p> <p><b>Coiera, E., Magrabi, F., &amp; Sintchenko, V. (2015). Guide to Health Informatics (3rd ed.)</b> ISBN-13:978-1444170498 You can <u>order the 3rd Edition from the publisher CRC Press</u> or <u>Amazon</u> (ISBN-13:978-1444170498).<a href="https://www.crcpress.com/Guide-to-Health-Informatics/Coiera/p/book/9781444170498">https://www.crcpress.com/Guide-to-Health-Informatics/Coiera/p/book/9781444170498</a></p> |
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|   | <p><b>Lytras, M. D., &amp; Papadopoulou, P. (2018). Applying Big Data Analytics in Bioinformatics and Medicine (pp. 1-465).</b> Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2607-0</p> <p><b>Papadopoulou, P., Lytras, M., &amp; Marouli, C. (2018). Bioinformatics as Applied to Medicine: Challenges Faced Moving from Big Data to Smart Data to Wise Data.</b> In M. Lytras, &amp; P. Papadopoulou (Eds.), <i>Applying Big Data Analytics in Bioinformatics and Medicine</i> (pp. 1-25). Hershey, PA: IGI Global. doi:10.4018/978-1-5225-2607-0.ch001</p>  |
| <p><b>INDICATIVE MATERIAL:</b><br/>(e.g. audiovisual, digital material, etc.)</p> | <p><b>REQUIRED MATERIAL:</b> N/A</p> <p><b>RECOMMENDED MATERIAL:</b> N/A</p>  |
| <p><b>COMMUNICATION REQUIREMENTS:</b></p>   | <p>N/A</p>  |
| <p><b>SOFTWARE REQUIREMENTS:</b></p>  | <p>Microsoft Word, Microsoft PowerPoint, Blackboard CMS</p>   |
| <p><b>WWW RESOURCES:</b></p>  | <p><a href="https://www.ncbi.nlm.nih.gov/pubmed/">https://www.ncbi.nlm.nih.gov/pubmed/</a></p> <p><a href="https://www.informaticseducation.org/">https://www.informaticseducation.org/</a></p> <p><a href="https://www.amazon.com/Health-Informatics-Practical-Guide-Seventh/dp/1387642413">https://www.amazon.com/Health-Informatics-Practical-Guide-Seventh/dp/1387642413</a></p> <p><a href="https://www.informaticseducation.org/single-post/2016/09/20/Data-Science-Resources">https://www.informaticseducation.org/single-post/2016/09/20/Data-Science-Resources</a></p> <p><a href="https://www.informaticseducation.org/single-post/2017/05/17/New-Open-Source-EHR-for-Education-Training-and-Research">https://www.informaticseducation.org/single-post/2017/05/17/New-Open-Source-EHR-for-Education-Training-and-Research</a></p> <p><a href="https://www.informaticseducation.org/single-post/2016/09/02/IBM-Watson-Analytics-Academic-Program">https://www.informaticseducation.org/single-post/2016/09/02/IBM-Watson-Analytics-Academic-Program</a></p> <p><a href="https://www.informaticseducation.org/single-post/2018/09/21/NHANES-Data-is-a-Treasure-Trove-for-Biomedical-Research">https://www.informaticseducation.org/single-post/2018/09/21/NHANES-Data-is-a-Treasure-Trove-for-Biomedical-Research</a></p> <p>the International Medical Informatics Association (IMIA)<br/><a href="http://imia-medinfo.org/wp/welcome-to-imia-2/">http://imia-medinfo.org/wp/welcome-to-imia-2/</a></p> <p>The Global Alliance for Genomics and Health (GA4GH)<br/><a href="http://genomicsandhealth.org">http://genomicsandhealth.org</a></p> <p>The European Bioinformatics Institute (EMBL-EBI)<br/><a href="https://www.ebi.ac.uk/about">https://www.ebi.ac.uk/about</a><br/><a href="https://www.ebi.ac.uk/services">https://www.ebi.ac.uk/services</a></p> <p>Examples of databases:<br/><a href="https://www.ncbi.nlm.nih.gov/genbank/">https://www.ncbi.nlm.nih.gov/genbank/</a><br/><a href="https://www.ncbi.nlm.nih.gov/nucleotide/">https://www.ncbi.nlm.nih.gov/nucleotide/</a><br/><a href="https://blast.ncbi.nlm.nih.gov/Blast.cgi">https://blast.ncbi.nlm.nih.gov/Blast.cgi</a><br/><a href="https://www.ncbi.nlm.nih.gov/refseq/">https://www.ncbi.nlm.nih.gov/refseq/</a><br/><a href="https://www.ncbi.nlm.nih.gov/omim/">https://www.ncbi.nlm.nih.gov/omim/</a><br/><a href="https://www.i-hd.eu/index.cfm/resources/ec-projects-results/transform/">https://www.i-hd.eu/index.cfm/resources/ec-projects-results/transform/</a><br/><a href="http://www.ehr4cr.eu/">http://www.ehr4cr.eu/</a></p> |
| <p><b>INDICATIVE CONTENT (LEC):</b></p>   | <ul style="list-style-type: none"> <li>• Overview of health and biomedical informatics, core competencies and</li> </ul>  |

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|  | <p>definitions</p> <ul style="list-style-type: none"><li>• Concepts, models and systems thinking, the language of Biomedical Informatics and data types</li><li>• Vocabulary, Data standards &amp; Semantics</li><li>• Databases, Data mining, Analytics and Data visualization</li><li>• Genome and proteome bioinformatics; next generation sequencing, automatic analysis, alignment, comparison and annotation of biological sequences; analysis of genome evolution and variation; molecular biology databases; structural bioinformatics; protein structure prediction; biomolecular systems simulation; systems biology; biological networks; pharmacoinformatics and biomedical computing.</li><li>• Electronic Medical Records &amp; Electronic Health Records</li><li>• Healthcare Management and Clinical Decision Support Systems</li><li>• Health Information Exchange &amp; Architectures of information systems</li><li>• Health information privacy, security and ethics</li><li>• Personal Health Information &amp; Consumer health informatics</li><li>• Knowledge representation &amp; clinical ontology</li><li>• Evidence based medicine and clinical practice guidelines</li><li>• Quality improvement strategies, patient safety and health information technology</li><li>• Cognitive, Human Factors, Usability, and Human Centered Aspects</li><li>• Natural Language &amp; Text Processing</li><li>• Bioinformatics Projects and Centers</li><li>• Specialty Informatics: Medicine, Nursing, Dentistry &amp; Public Health</li><li>• Translational Informatics</li><li>• Future directions</li></ul> |
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