

**INTRODUCTION TO MEDICAL IMAGE ANALYSIS**

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| 1. **Imprint**
 |
| *Name of faculty:* | Faculty of Medicine and Dentistry |
| *Programme of study (field of study, level and educational profile, form of study eg.: 2nd Faculty of Medicine, English Division, intramular, full-time):* | English Dentistry Division, full cycle, practical profile, intramural, full time |
| *Academicyear:* | 2016/2017 |
| *Name of module/ subject:* | **INTRODUCTION TO MEDICAL IMAGE ANALYSIS** |
| *Subject/coursecode:* |  |
| *Unitsconducting the course:* | Department of Dental and Maxillofacial Radiology, Medical University of WarsawNowogrodzka 59, 02-006 Warszawa(+48 22) 502 12 72 |
| *Head of the Unit/Department:* | **Professor Kazimierz Szopiński MD, PhD** |
| *Year of study (year on which the course is conducted):* | IV  |
| *Semester of study (semester on which the course is conducted):* | 8th |
| *Type of module/subject (basic course, specialization course, optional course):* | Optional course |
| *ALL the persons conducted activities(names, surnames and their degrees):* | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| *Erasmus YES/NO (if the course is available for the Erasmus students):* | YES |
| *The person in charge of syllabus (the person to whom remarks can be directed):* | Piotr Regulski DMD, PhD, (+48 22) 502 12 72 |
| *Number of ECTS:* | 0,75 |
| 1. **Educationalobjectives**
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| 1. To familiarize the students with the Cone Beam Computed Tomography software
2. To familiarize the students with the computer image processing methods (affine transforms, filtration, morphological operations, segmentation, linear measurements, rendering)
3. To familiarize the students with the medical file formats (DICOM)
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| 1. **Prerequisitiverequirements**
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| 1. Basic computerskills.
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| 1. **Learning outcome of a course**
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| **List of learning outcomes** |
| Symbol | Description | Relation to a learning outcome  |
| W1 | Know the basic methods of reconstruction and image processing of medical images | **B.W9, B.U3, E.W2, F.W21** |
| U1 | Can use cone beam computed tomography software | **B.W9, B.W13, E.U5, F.W21, F.U6** |
| U2 | Can save the result of radiological examination | **B.W9, B.W13, F.W21, F.U6** |
| 1. **Forms of conductedactivities**
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| *Form* | *Number of hours* | *Number of groups* | *Minimal number of sudents in a group* |
| *Lecture* | 0 | 0 | - |
| *Seminar* | 5 | 1 | - |
| *Classes* | 10 | 1 | - |
| 1. **The subjects of activities and curriculum content**
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|  | The subject of the seminar | Curriculum content | Lecturer |
| S1 – seminar 1 | 3D image characteristics | - medical image as function- image discretization effects | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| S2 – seminar 2 | Presentation of 3D image | - multiplanar reconstruction - volume rendering- maximum intensity projection- isosurface | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| S3 – seminar 3 | Affine transforms,Linear measurements,Filtration | - affine transforms- filtration- gradients- linear measurements | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| S4 – seminar 4 | Morphological operationsFile formats | - dilatation, erosion, opening- skeletization- DICOM, JPEG, TIFF formats | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| S5**-** seminar 5 | Segmentation | - thresholding- watershed segmentation- region growing | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| C1- class 1 | Ez3Dplus (Vatech) – CBCT software | - multiplanar reconstruction - volume rendering- maximum intensity projection- linear and angular measurements- segmentation- handling with implant module | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| C2- class 2 | Romexis Viewer (Planmeca) – CBCT software | - multiplanar reconstruction - volume rendering- maximum intensity projection- linear and angular measurements- segmentation- handling with implant module | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| C3- class3 | OnDemand3Dapp (Soredex) – CBCT software | - multiplanar reconstruction - volume rendering- maximum intensity projection- linear and angular measurements- segmentation- handling with implant module | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |
| C4- class 4 | VisNow – generic visualization framework1 | - image presentationwith fieldViewer3D- filtration | ProfessorKazimierzSzopiński MD, PhDPiotrRegulski DMD, PhDStanisławJalowski, DMD |
| C5- class 5 | VisNow – generic visualization framework2 | -isosurface- 2D slices- volume rendering- image annotations- file formats | Professor Kazimierz Szopiński MD, PhDPiotr Regulski DMD, PhDStanisław Jalowski, DMD |

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| 1. **Methods of verification of curriculum content**
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| Course learning outcome  | Forms of conductedactivities | Methods of learning outcome verification | Criterium of credit for a course |
| W1 | seminars, classes | continuous assessment during seminars and classes | Active participation in the seminars and classes. More than 60% of correctly accomplishedclasses |
| U1 | seminars, classes | continuous assessment during seminars and classes | Active participation in the seminars and classes. More than 60% of correctly accomplishedclasses |
| U2 | seminars, classes | continuous assessment during seminars and classes | Active participation in the seminars and classes. More than 60% of correctly accomplishedclasses |
| 1. **Evaluation criteria**
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| **The form of credit for a course: credit (graded)** |
| grade | criteria |
| **2,0 (unsatisfactory)** | 0-60% correctly accomplishedclasses |
| **3,0 (satisfactory)** | 61-68% correctly accomplished classes |
| **3,5 (betterthansatisfactory)** | 69-76% correctly accomplished classes |
| **4,0 (good)** | 77-84% correctly accomplished classes |
| **4,5 (betterthangood)** | 85-92% correctly accomplished classes |
| **5,0 (verygood)** | 93-100% correctly accomplished classes |
| 1. **Literature/Textbooks**
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| Obligatoryliterature/textbooks: 1. Dougherty G., Medical Image Processing. Techniques and Applications,Springer, 2011
2. White SC, PharoahMJ,Oral Radiology. Principles and Interpretation. 7th Edition, Elsevier, 2014
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| 1. **ECTScalculation**
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| ***Form of activity*** | ***Number of hours*** | ***ECTS points*** |
| ***Contact hours with an academic teacher:*** |
| Lecture | **0** | **0** |
| Seminar | **5** | **0,15** |
| Classes | **10** | **0,3** |
| ***Form of activity*** | ***Number of hours*** | ***ECTS points*** |
| **Student individual workload (**exemplary work form**):** |
| Preparationworkload to seminar | **5** | **0,15** |
| Other (Preparation workload to classes) | **10** | **0,15** |
| In total | **30** |  **0,75** |
| 1. **Additionalinformation**
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| Students may join the Student Club of Dentomaxillofacial Radiology, tutor Professor KazimierzSzopiński MD, PhD, contact: the administrative office of the Department of Dentomaxillofacial RadiologyThe seminars are held in theDentomaxillofacial Radiology Department |