



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Simulation and digital human modelling

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### Course

Field of study

Safety Engineering

Area of study (specialization)

Ergonomics and Work Safety

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

elective

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### Number of hours

Lecture

15

Tutorials

Laboratory classes

15

Projects/seminars

15

Other (e.g. online)

### Number of credit points

3

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### Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Zarządzania

ul. Jacka Rychlewskiego 2, 60-965 Poznań

Responsible for the course/lecturer:

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### Prerequisites



The student starting the classes should be fluent in using CAD applications and have basic knowledge about designing and diagnosing the level of ergonomics of processes and products.

### Course objective

The aim of this course is to present the aims and possibilities of using the Digital Human Model (DHM) in designing and diagnosing ergonomics.

### Course-related learning outcomes

#### Knowledge

1. has knowledge of the characteristics of the world's most popular human digital models with design and diagnostic applications [P7S\_WG\_02];
2. has knowledge enabling selection of appropriate digital models for design and diagnostic processes [P7S\_WG\_03];
3. is familiar with selected computer programs with implemented DHM [P7S\_WG\_07];

#### Skills

1. can reproduce in a computer program the work process or the evaluated products [P7S\_UW\_04];
2. is able to select methods of assessment analysis to support design decisions in the period of shaping the required level of ergonomicity of a product or workplace [P7S\_UW\_06];
3. is able to perform an analysis of the ergonomics of the work process and product and design corrective actions according to the principles of ergonomics [P7S\_UO\_01];
4. is able to improve their skills in operating applications supporting design with the use of digital human models (DHM) [P7S\_UUO\_01];

#### Social competences

1. is aware of the possibility of using digital human models in improving work processes and products [P7S\_KK\_02];
2. is aware of the complexity of assessing the ergonomics of work processes and products using digital human models [P7S\_KK\_01];

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Formal evaluation:

- a) exercises: current evaluation (on a scale from 2 to 5) of the tasks and colloquia,
- b) projects: evaluation of the implementation of project tasks,
- c) lectures: assessment of responses during a written colloquium.

Summary evaluation:



- a) exercises: average of partial tasks' marks; a pass after obtaining at least 3.0,
- b) projects: assessment of the implementation of the project tasks carried out in the subchapters; a credit after obtaining at least a score of 3.0 (the condition is to prepare all main tasks),
- c) lectures: a written colloquium (answers to 30 open and closed questions) of the content presented during the lecture; each answer is scored on a scale from 0 to 1; the score is calculated after summing up the points and recalculating according to the scale provided for in the study regulations.

### Programme content

Basic functions of digital human models (DHM). Construction of DHM models. Computer applications using DHM. Diagnostic methods used in DHM. Measuring apparatus in diagnostics and designing work processes and products using DHM.

### Teaching methods

Lecture supported by a multimedia presentation and simulation shows. During the laboratory classes, students use the measuring equipment and instructions for exercises. During the design classes, the students design the process of research and analysis of ergonomics of work processes using measuring equipment and digital human models.

### Bibliography

#### Basic

Bertilsson E., Högberg D., Hanson L., 2010, Digital Human Model Module and Work Process for Considering Anthropometric Diversity, Proceedings of 3rd Applied Human Factors and Ergonomics (AHFE) International Conference 2010, Karwowski, W. and Salvendy, G. (Eds.), USA,

Dahlke G., 2020, Metody pomiarowe w diagnozowaniu procesów praodukcyjnych, (materiały przygotowane do druku)

Dahlke G., 2014, Modelowanie symulacyjne w ergonomii i bezpieczeństwie pracy, w: Zeszyty Naukowe Politechniki Poznańskiej, Seria: Organizacja i Zarządzanie, nr 63, Wydawnictwo Politechniki Poznańskiej, Poznań

Duffy V. G. (Ed.), 2011, Digital Human Modeling, Third International Conference, ICDHM 2011, Held as Part of HCI International 2011, Orlando, FL, USA, July 2011, Proceedings, Springer, p. 546

#### Additional

Dahlke G., 2013, Zarządzanie bezpieczeństwem pracy i higieną pracy, WPP, Poznań

Dahlke G., JASIAK E., 2003, Principles of developing hypermedia tools to aid corporate occupational safety management based on practical studies: sample application, [in:] Mind and Body in a Technological World (Proceedings - NES 2003: 35th Annual Conference of the Nordic Ergonomics Society, Reykjavik, Iceland, August 10-13, 2003) pp. 115-119



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Dahlke G., Repiński M., Śnieżko Paweł, 2014, Ocena ergonomiczności stanowisk pracy motorniczych tramwajów, w: Logistyka / Instytut Logistyki i Magazynowania, Materiały XI Konferencji Naukowo-Technicznej : Logistyka, systemy transportowe, bezpieczeństwo w transporcie LogiTrans, Szczyrk, 07-10 kwietnia 2014- CD-ROM

Dahlke G., Olszewski J., Olszewski M., 2016, Model humanoidalny w analizie obciążeń statycznych operatorów wózków widłowych. Studium przypadku, Zeszyty Naukowe Politechniki Poznańskiej seria Organizacja i Zarządzanie, Nr 70

Dahlke G., Drzewiecka-Dahlke M., 2018, Work Posture Analysis in the Ergonomic Assessment of Products - A Case Study, [in:] Richard H. M. Goossens (ed.), Advances in Social and Occupational Ergonomics, Proceedings of the AHFE 2018 International Conference on Social and Occupational Ergonomics, July 21–25, 2018, Loews Sapphire Falls Resort at Universal Studios, Orlando, Florida, USA, pp. 258-271

Faraway J., Reed M. P., 2007, Statistics for Digital Human Motion, Modeling in Ergonomics, Technometrics, 49:3, 277-290,

Paul G., Wischniewski S., 2012, Standardisation of digital human models, Ergonomics, 55:9, 1115-1118

### Breakdown of average student's workload

	Hours	ECTS
Total workload	110	3,0
Classes requiring direct contact with the teacher	45	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	65	2,0

<sup>1</sup> delete or add other activities as appropriate