Universität Stuttgart

Institut für
Photogrammetrie

Direktor
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Aktenzeichen

13.09.2023

Vorlesungsankündigung

Im Wintersemester 2023/2024 bietet das Institut für Photogrammetrie (ifp) folgende Lehrveranstaltungen an:

Studiengang Geodäsie und Geoinformatik (Bachelor)

1. Semester

Einführung Geodäsie & Geoinformatik / Introduction Geodesy & Geoinformatics

Prof. Dr.-Ing. U. Sörgel u.a.

32197501, 2V, Kernfach, M 11.82	Dienstag, 11:30 – 13:00 Uhr
32197502, 2Ü, Kernfach, M 2.11	Donnerstag, 14:00 – 15:30 Uhr
	Beginn: 17. 10. 2023

3. Semester

Geoinformatik 1 / Geoinformatics 1

Dr.-Ing. V. Walter

321976010, 2V, Kernfach, M 24.01	Donnerstag, 11:30 – 13:00 Uhr
321976020, 2Ü, Kernfach, CIP-Pool	Freitag, 14:00 – 17:00 Uhr
	Beginn: 19. 10. 2023

Einführung in GIS, Dateneingabe (Methoden, Quellen, Hardware, Interaktion, Datentypen, Datenstrukturen, Bedeutung der einzelnen Datenquellen), Datenverwaltung (Dateiensysteme, Datenbanksysteme, Datenmodelle), Repräsentationsschemata, Operationen (Eingabe, Löschen, Verändern), raumbezogene Zugriffs- und Speicherstrukturen, Amtliche Informationssysteme	Introduction to GIS, data capture (methods, data sources, hardware, data types and data structures), data administration (file systems, databases, data models), representation schemes, operations in databases, spatial access and data structures, official information systems

Prüfung: 60 Min. schriftlich

5. Semester

Bildverarbeitung / Image Processing

apl. Prof. Dr.-Ing. N. Haala

321986050, 2V, Kernfach, M 24.12	Mittwoch, 10:30 – 12:00 Uhr
321986060, 1Ü, Kernfach, M 24.12	Mittwoch, 12:15 – 13:00 Uhr
	Beginn: 18. 10. 2023

Aufgaben und Anwendungen der digitalen Bildverarbeitung, Erfassung und Repräsentation digitaler Bilder, Bildvorverarbeitung und Bildverbesserung, geometrische Transformationen, Faltungsoperationen, Filtern digitaler Bilder im Orts- und Frequenzraum, Korrelation und Bildzuordnung, morphologische Operationen auf Binär- und Grauwertbildern	Tasks and applications of digital image processing, acquisition and representation of digital images, image preprocessing and enhancement, geometric transformations, convolution, filtering operations in image and frequency domain, correlation and image matching, morphological operations on binary and greyvalue images.

Prüfung: 20 Min. mündlich

Photogrammetrie / Photogrammetry

Dr.-Ing. M. Cramer

321986030, 2V, Kernfach, M 24.12	Mittwoch, 8:45 – 10:15 Uhr
321986040, 1Ü, Kernfach, M 24.12	Mittwoch, 8:00 – 8:45 Uhr
	Beginn: 18. 10. 2023, 8:45

Einführung, physikalische Grundlagen der Bildentstehung, Optik, Bildqualität, Bildgeometrie, Kamerakonzepte, Kamerakalibrierung, Aufnahmesysteme, mathematische Konzepte der perspektiven Abbildung, Rückwärtsschnitt, Vorwärtsschnit und Triangulation, Erzeugung photogrammetrischer Produkte, Orthophoto, 3D Oberflächenmodelle	Introduction, Physics of imaging, optics, image quality, imaging geometries, camera concepts, camera systems, camera calibration, mathematical concepts of perspective geometry, resection, intersection and triangulation, photogrammetric product generation, orthophoto, 3D surface models

Prüfung: 90 Min. schriftlich

Studiengang Geodäsie und Geoinformatik (Master)

1. Semester

Aerotriangulation / Aerotriangulation

Dr.-Ing. M. Cramer

321021301, 1V, Kernfach, M 24.12 — Donnerstag, 8:00 – 8:45 Uhr

321021302, 1Ü, Kernfach, M 24.12 — Donnerstag, 8:45 – 9:30 Uhr

Beginn: 19. 10. 2023, 8:00 Uhr

Mathematische Grundlagen der Aerotriangulation (AT), automatische Aerotriangulation, Erweiterte AT – Zusätzliche Parameter, GPS-gestützte Aerotriangulation, Direkte Georeferenzierung, Digitale photogrammetrische Stereoauswertung	Mathematical concepts of aerial triangulation (AT), automated aerial triangulation, extended aerial triangulation – additional parameter, GPS-supported aerial triangulation, direct georeferencing, digital photogrammetric stereo plotting

Prüfung: 40 Min. mündlich zusammen mit Computer Vision zur bildbasierten Geodatenerfassung

Computer Vision zur bildbasierten Geodatenerfassung / Computer Vision for Image-based Acqusition of Geodata

apl. Prof. Dr.-Ing. N. Haala

321021303, 1V, Kernfach, M 24.12 — Dienstag, 11:30 – 12:15 Uhr

321021304, 1Ü, Kernfach, M 24.12 — Dienstag, 12:15 – 13:00 Uhr

Beginn: 17. 10. 2023

Bildzuordnungsverfahren für die automatische Bildorientierung und 3D Objekterfassung, Extraktion und Zuordnung von Merkmalspunkten, projektive Geometrie und Structure-from-Motion, dichte Stereobildzuordung, Grundlagen der Mustererkennung	Image matching for automatic image orientation and 3D object reconstruction, extaction and matching of feature points, projective geometry and structure-from-motion, dense stereo image matching, pattern recognition principles

Prüfung: 40 Min. mündlich zusammen mit Aerotriangulation

3. Semester

Signalverarbeitung / Signal Processing

Prof. Dr.-Ing. U. Sörgel

321021101, 1V, Wahlpflicht, GSS 24_2.370	Donnerstag, 11:30 – 12:15 Uhr
321021102, 1Ü, Wahlpflicht, GSS 24_2.370	Donnerstag, 12:15 – 13:00 Uhr
	Beginn: 19. 10. 2023

NN	NN

Prüfung: NN

Simultaneous Localisation and Mapping (SLAM)

Prof. Dr.-Ing. T. Hobiger, apl. Prof. Dr.-Ing. N. Haala, u.a.

321023401, 2V, Wahlpflicht,	M 2.31	Dienstag, 11:30 – 13:00 Uhr
	M 24.12	Freitag, 9:45 – 11:15 Uhr
321023402, 2Ü,	Rechnerraum ifp	Freitag, 11:30 – 13:00 Uhr
		Beginn: 17. 10. 2023

Current SLAM methods are discussed using papers with associated code and examined with our own data. The methods include aspects of the complete SLAM evaluation chain from the front-end such as feature tracking and loop closure to the back-end with pose estimation, graph SLAM and bundle block adjustment. For the experiments, data such as odometry, IMU, LiDAR, and image sequences will be acquired using a TurtleBot2 robotic kit and integrated ZED camera, and a reference trajectory will be determined using an external camera. Participation in the exercise is a prerequisite for admission to the exam.	Current SLAM methods are discussed using papers with associated code and examined with our own data. The methods include aspects of the complete SLAM evaluation chain from the front-end such as feature tracking and loop closure to the back-end with pose estimation, graph SLAM and bundle block adjustment. For the experiments, data such as odometry, IMU, LiDAR, and image sequences will be acquired using a TurtleBot2 robotic kit and integrated ZED camera, and a reference trajectory will be determined using an external camera. Participation in the exercise is a prerequisite for admission to the exam.

Prüfung: 30 Minuten mündlich

Projekt Geodäsie und Geoinformatik

apl. Prof. Dr.-Ing. N. Haala, u.a.

321022601, 6P, Wahlpflicht, M 24.12	Mittwoch, 14:00 – 15:30 Uhr
	Beginn: 18. 10. 2023

NN	NN

Prüfung: NN

Master Course Geomatics Engineering

1st Semester

Signal Processing

Prof. Dr.-Ing. U. Sörgel, Dr.-Ing. M. Cramer

324122050, 2V, M 24.01	Tuesday, 14:00 – 15:30
324122060, 1Ü, GSS 24_2.370	Wednesday, 15.45 – 17:15, biweekly
	Start: 17. 10. 2023

Today signal processing has become a foundation in many disciplines. In the course of technological development digital systems employing signal processing are included in many IT products as well as in consumer electronics. For this reason basic knowledge of signal processing is essential to all engineering disciplines, especially to geomatics engineering. It provides the foundation for a deeper understanding of advanced topics such as terrestrial and aerial data acquisition, navigation and others. This lecture is accompanied and complemented by exercises, which are carried out on computers using the MATLAB® Signal Processing Toolbox.

60 min written exam as part of examination Module 2

3rd Semester

Pattern Recognition

Prof. Dr.-Ing. U. Sörgel

327779030, 2V, M 17.73	Wednesday, 11:30 – 13:00
327779040, 1Ü, GSS 24_2.370	Thursday, 14:00 – 15:30 biweekly
	Start: 18. 10. 2023

Introduction to pattern recognition, image preprocessing and feature extraction, knowledge based image analysis, decision theory and numerical classification, Bayesian networks and Markov Random Fields, applications for photogrammetric image analysis

60 min written exam as part of examination Module 11

Geoinformatics

Dr.-Ing. V. Walter

324125010, 2V, M 11.82	Wednesday, 14:00 – 15:30
324125020, 2Ü, CIP-Pool	Friday, 14:00 – 17:00
	Start: 18. 10. 2023

Introduction to GIS, data capture (methods, data sources, hardware, data types and data structures), data administration (file systems, databases, data models), representation schemes, operations in databases, spatial access and data structures, official information systems

60 min written exam as part of examination Module 6

Computer Vision

apl. Prof. Dr.-Ing. N. Haala

327779010, 2V, GSS 24_2.370	Tuesday, 14:00 – 15:30
327779020, 1Ü, M 24.01	Wednesday, 15:45 – 17:15, biweekly
	Start: 17. 10. 2023

Close range sensors (CCD, CMOS, CIR), terrestrial LiDAR, Mobile Mapping Systems, direct and indirect solutions for spatial resection, simultaneous registration using SIFT and affine SIFT operators, RANSAC algorithms, SLAM problems, Structure-and-Motion, dense point cloud generation using image matching, fusion of LiDAR and image-generated point clouds, ICP algorithms

60 min written exam as part of examination Module 8

Studiengang Luft- & Raumfahrtechnik (Master)

2. Semester

Einführung in die projektive Geometrie / Introduction into projective Geometry

Dr.-Ing. M. Cramer

323949600, 2V, M 2.31

Mittwoch, 14:00 – 15:30
Start: 18. 10. 2023

Photogrammetrische Grundbegriffe, Fernerkundung,- Anwendungen, Trägerplattformen (Satelliten / Flugzeuge), Kameradesign, digitale Luftbildkameras – Zentralperspektive, Sensororientierung, Orthophotoerzeugung, Aerotriangulation	Photogrammetric terminology, remote sensing, applications, sensor platforms (satellite / airborne), camera design, digital airborne camera systems, central perspective, sensor orientation, orthophoto generation, aerial triangulation

Prüfung: 20 Min. mündlich

Bildverarbeitung / Image Processing

Siehe: *Bachelorvorlesung Bildverarbeitung, Geodäsie und Geoinformatik, 5. Semester*

Master Course Infrastructure Planning

1st Semester

Introduction to GIS

Dr.-Ing. V. Walter

27119, 2V, V 57.04

Monday, 15:45 – 17:15
Start: 23. 10. 2023

Definition and Examples, GIS Components, Data Acquisition Techniques Overview, Photogrammetry and Remote Sensing, Secondary Data Acquisition, Data Modelling, Data Analysis, GIS Data Presentation / Cartography

60 min written exam as part of examination Module “Statistics and GIS”