

《数字化测图》教学内容探讨

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摘要:根据测绘生产单位对工程测量技术人才的需求,并针对《数字化测图》课程的特点,对以一幅地形图测绘为主线的教学内容进行探索与实践,通过不断的调整与改革,从而提高高职工程测量技术专业的教学质量,增强学生的动手能力和就业竞争力。

关键词:数字化测图; 教学内容; 研究

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高职的《数字化测图》课程理论教学既不同于本科层次教学,又有别于中专层次教学。就特点而言,本科教学是重视理论、夯实基础,中专层次是淡化理论、注重实践,而高职层次的教学是既要求具备一定的理论基础,又要强化实训操作。因此,在数字测图课程的理论教学中,任课教师要根据高职教育的特点,特别注意把握好教学的理论深度和难度系数。针对高职院校培养面向基层生产岗位的一线技术人员的特点,我们在讲授数字测图技术课程时,以完成一幅地形图测绘为主线,以培养数字测图的基本理论、基本技术、基本作业方法及操作水平为出发点,加强实用性教学,主抓野外选点、合格的观测和绘图软件编辑处理的培训。培养具有较强的内外业动手能力和分析和解决问题的能力的应用性测绘人才。

1 课程定位

1.1 工程测量技术专业的培养目标

工程测量技术专业主要培养,面向测绘、水利、地矿、交通、城镇规划、市政建设、房产、国土资源等行业测绘生产第一线,能从大比例尺地形图测绘、市政工程测量、房屋建筑测量、公路铁路施工测量,水利工程测量、变形观测、地质勘探测量、矿山测量、地籍测量及土地管理、房屋测量、测绘仪器销售等测绘生产与管理工作的技能应用性人才,详细情况见表1。

1.2 人才需求调研情况

通过多次调研,我们了解到学生分配到吉林省地矿测绘院、珲春规划院、长春方圆地理信息有限公司等单位后的主要工作就是大比例尺数字地形图和数字地籍图的测绘。在统计我校工程测量技术专业毕业生的分配去向,我们认识到我院工程测量技术专业从事国家基础测绘的比例较高。

表1 工程测量技术专业定位表

服务面向	测绘、水利、地矿、交通、城镇规划、市政建设、房产、国土资源
就业去向	测绘、道路桥梁、工程监理、水利水电工程、工业与民用建筑工程、城市规划等单位
就业岗位	水准测量工、地形测量工、GPS 测量工、控制测量工、工程测量工等工种岗位
工作内容	控制测量、地形测量、工程测量、变形监测、地籍测量、房产测量、工程监理等
岗位证书	地形测量工、中级放线工、高级测量工等工种岗位证书

1.3 本课程在课程体系中的定位

数字化测图技术是近些年随着计算机、地面测量仪器、数字化测图软件的应用而迅速发展起来的全新内容,广泛用于测绘生产、水利水电工程等部门。数字化测图作为一种全解析机助测图技术,与模拟测图相比具有显著优势和发展前景。目前许多测绘部门已经形成了数字图的规模生产。数字测图技术将逐步取代人工模拟测图,成为地形测图的主流。因此,《数字化测图》是高职工程测量技术专业的一门核心技能课程,它既与学习控制测量、工程测量、地籍测量等专业课程紧密相关,又为从事测绘生产工作打下坚实的基础。

2 教学内容选取

《数字化测图》课程应立足于对学生实际能力的培养,因此对课程内容的选择标准作了根本性改革,打破以知识传授为主要特征的传统学科课程模式,转变为以真实工作任务及其工作过程为依据,以职业岗位实际工作任务所需要的知识、能力、素质要求为本位,选取教学内容,让学生在完成具体项目的过程中来构建相关理论知识,并发展职业能力。以完成一幅典型地形图(包括地物和地貌)测绘为教学主线,本课程

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应该具有以下项目:认识数字测图的硬件和软件、全站仪图根控制数据采集、全站仪野外数据采集、数字测图内业绘图、地形图的扫描矢量化、数字测图技术设计和质量检验、数字地形图的应用等,涵盖所有要传授的知识点,基于工作过程,按照从简单到复杂的认知过程进行组织;按照教、学、做相结合,理论与实践一体化的原则精心设计;在专业能力培养的同时,还要综合考虑方法能力和社会能力的培养,做到职业素质和综合能力并重。

3 教学内容组织

在本课程的内容组织上,以完成一幅地形图测绘为基础,考虑学生的认知水平,由浅入深地安排本课程的内容。总体内容组织顺序如下:认识数字测图的硬件和软件 全站仪图根控制数据采集 全站仪野外数据采集 数字测图内业绘图 地形图的扫描矢量化 数字测图技术设计和质量检验 数字地形图的应用,详细情况见表2。

表2 数字化测图课程内容组织表

项目	子项目	课程内容及要求	参考课时
1、认识数字测图的硬件和软件	认识数字测图的硬件	1、能够简单操作数字测图硬件系统中扫描仪、绘图仪等; 2、了解全站仪的构造及架设; 3、掌握全站仪的基本功能。	6
	认识数字测图的软件	1、了解数字测图的常见软件系统; 2、能够初步使用数字测图中的一些软件,如CASS等。	2
2、全站仪图根控制数据采集	全站仪图根控制数据采集	1、图根导线的布设与图根点的标定; 2、使用辐射法(极坐标法)、交会法、支导线法、自由设站法等方法增设测站点。	12
	草图法	1、全站仪野外数据采集的设站; 2、大比例尺野外碎部点采集注意事项; 3、草图绘制的基本方法。	8
3、全站仪野外数据采集	编码法	1、地形要素编码的方法; 2、南方CASS简码编制的方法; 3、全站仪野外数据采集的编码方法; 4、南方CASS简码文件识别和引导编码文件。	6
	电子平板法	1、南方测图精灵电子平板野外测图的特点及成图方法; 2、EPSW的特点及成图方法。	4
	数据传输与处理	1、全站仪数据下载方法; 2、利用EXCEL表格处理测量数据。	4
4、数字测图内业绘图	绘图处理	1、CASS系统草图法地物的编绘方法; 2、CASS系统编码文件自动绘图; 3、CASS系统地貌编绘方法; 4、CASS系统地形图综合编辑。	12
	图幅处理及图形输出	1、CASS系统分幅方法; 2、CASS系统地形图输出。	4
5、地形图的扫描矢量化	纸质地形图的扫描	1、图纸扫描操作过程。	2
	纸质地形图的矢量化	2、在CASS软件中进行地形图矢量化。	4
6、数字测图技术设计和质量检验	数字测图技术设计	1、数字测图技术设计; 2、技术设计书的编写; 3、数字测图技术总结。	4
	数字测图产品质量检验	1、数字测图产品的质量控制; 2、数字测图产品的野外验收; 3、数字测图产品的资料验收; 4、验收报告的编写。	2
7、数字地形图的应用	数字地形图在工程中的应用类型	1、数字地形图在工程建设中的应用。	4
	在数字地形图上用CASS菜单完成纵断面图绘制	1、在数字地形图上用CASS菜单完成纵断面图绘制; 2、在数字地形图上用CASS菜单完成横断面图绘制。	2
	在数字地形图上进行土石方计算	1、在CASS软件中运用多种方法进行土石方的计算。	2
综合考评	综合能力测试		2
机动			4
学时总计			84

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Abstract Urgent monitoring of earthquake disasters need thematic maps of remote sensing. According to the distribution of the earthquake and the secondary disasters, classifications and coding of disaster information were analyzed. With the national basic scale topographic maps and thematic map symbols of the type, size, color etc separately defined at different scales, it was produced that thematic symbol library of the corresponding earthquake and secondary disasters. Meanwhile, standard for thematic maps of the disaster and the secondary disasters was formed. The templates met the cartography requirements of GIS applications, which can provide accurate disaster information and affected body quickly, and improved the mapping efficiency. It is useful to save time for the rescue and assure the earthquake relief work can be undertaken smoothly.

Key words earthquake, the secondary disasters, symbol database, mapping templates (Page:153)

Preliminary Understanding and Simple Analysis of Numerical Calculation Errors by LIU Ping

Abstract This paper introduced the classification of numerical calculation errors, and used math expressions as examples to illustrate truncation error. According to IEEE754 criterion, this paper used math expressions to explain rounding error. Then this paper simply analyzed the truncation error and rounding error. At last, this paper pointed out attentions in the numerical calculation.

Key words numerical calculation, calculation errors, preliminary understanding, simple analysis (Page:156)

Application of the Second Land Investigation's Result to Daily Land and Resources Management by XU Yong

Abstract This paper introduced the basal informations, technical route, investigating methodology and investigation's result of the WUHAN Second Time Land Investigation, and discussed the applying of the Second Time Land Investigation's result based on the daily Land and Resources Management's requirement.

Key words land investigation, land management, cadastral management (Page:159)

Method for Prediction of Landslide by Phase Space Reconstruction by XIONG Tianan

Abstract In view of the nonlinear characteristics of landslide displacement time sequence, this paper introduced the prediction method based on phase space reconstruction and least squares support vector machine (LSSVM). Used Cao's method to determine the embedding dimension, according to mutual information method to compute the best delay time; Then in the phase space, used least squares support vector machine (LSSVM) to establish the forecast model to compared with LSSVM and the neural network predicting mode. The test result show that the model has the high precision, is scientific and feasible.

Key words predictable mode; landslide prediction; phase space reconstruction; least squares; neural network (Page:162)

Application of SET 1X Total Station Device to Tunnel Through Survey by CHEN Sansheng

Abstracts Combined with the application in Pusagang tunnel through survey of Yalu Highway of SET 1X total station device, elaborated the adoptive ways and technical measurements of tunnel through survey so as to make sure the accurate perforation of the tunnel.

Key words total station device, Pusagang tunnel, perforation survey, control survey (Page:165)

Evaluation of Uncertainty of GPS Receiver Calibration and Calibration Results by HE Hao

Abstract Based on the actual calibration GPS receiver's experience, through the GPS receiver calibration method of in-depth research, with

practical examples, the calibration process problems encountered were analyzed and investigated

Key words GPS receiver, Calibration, measuring error, uncertainty (Page:168)

Establishment of Monitoring Data Processing and Analysis System with Excel VBA Programming by ZHU Xingang

Abstract Excel is popular office software which we often use at work. Excel itself provides a strong secondary development function, VBA, which has powerful programming capabilities. This article described how to use Excel VBA to create a complete deformation monitoring system to realize simple, rapid, accurate and automated monitoring job.

Key words Excel, VBA, deformation monitoring data processing and analysis system (Page:170)

Application of Robotic Total Station in Volume of Vertical Metal Cans by ZHU Lianghua

Abstract The application of robotic total station in volume surveying of vertical metal cans was introduced in this paper. The surveying preparation work, fieldwork, data processing and key technology were discussed detailed combining an example.

Key words total station, vertical metal cans, volume surveying (Page:173)

Matlab and Visual C++ Mixing Programming to Process the Data of the South Total Station by HU Jiaying

Abstract During the indoor work data checking, we often compared the point's field work coordinate with its indoor work coordinate. So we could find if there be some points were artificial, or some points had been moved. At the same time, the processed data could direct provide the three dimension coordinate, it was helpful for the next measure work. This article took the South total station instrument for example, based on matlab and Visual C++ mixing programming to generate the directly executable file, which could separate from the MTALAB environment, then gave the code and the images of the result.

Key words MTALAB, hybrid programming, data processing (Page:175)

Research of Teaching Content in Digital Surveying & Mapping by MENG Fanchao

Abstract Based on the production units of the engineering survey mapping and technical personnel needs, and for "Digital Mapping" characteristics of the course to a topographic mapping of the main line to explore the teaching content and practice, through the constant adjustment and reform to improve Higher engineering professional teaching quality measurement techniques, enhanced their ability and employability and competitiveness.

Key words Digital Surveying & Mapping, teaching, research (Page:178)

Strengthening the teaching of surveying error theory for GIS by ZHAO Dongbao

Abstract Surveying error analysis and treatment is the basic theory which lay a solid foundation for students majored in GIS studying surveying courses, and is also the key to understand surveying principle of various surveying courses. Aiming at the problem that many colleges lacked the uniform plan for surveying error theory course teaching for GIS major students, teaching contents of surveying error theory course for GIS major students were discussed, and teaching schedule was arranged based on characteristic of surveying error theory teaching, and teaching methods of surveying error theory course for GIS major students were listed according to related teaching experience.

Key words GIS major, surveying error theory, teaching contents, teaching method (Page:180)