

CSIS Discussion Paper No. 70

北米大学 14 校の地理情報科学教育システム

Geographic Information Science Education Systems
at 14 Universities in North America

*

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2006 4

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1. はじめに

GIS

GIS

GIS Geographic Information Systems
GIScience Geographic Information Science

NCGIA National Center for Geographic Information and Analysis 1990 GIS

Goodchild Kemp, 1990; NCGIA, 1997

NCGIA 2000

UCGIS University Consortium for Geographic Information Science

GI S&T Geographic Information Science and Technology

UCGIS, 2003; DiBiase *et al.*, 2006

GIS GISCI GIS Certification Institute GIS

GIS

2005

A

<http://curricula.csis.u-tokyo.ac.jp/>

GIS

<http://gis.sk.tsukuba.ac.jp/>

2. 北米大学 14 校の調査

2.1 調査対象の大学

	NCGIA	UC	NY	UCGIS
			3	UCGIS, 2003
			UC	
				NJ
	10			1
	14	1		
1	14			
<hr/>				
*			Arizona State Univ.	
*			California State Polytechnic Univ. at Pomona	-
*			Louisiana State Univ.	-
*			Ohio State Univ.	-
*			Pennsylvania Univ.	-
*			Rutgers, The State Univ. of New Jersey	-
*			San Diego State Univ.	
**	NY		Univ. of British Columbia	
**			Univ. at Buffalo, The State Univ. of New York	
**			Univ. of California, Santa Barbara	
**			Univ. of Maine	
*			Univ. of New Mexico	-
*			Univ. of Oregon	-
*			Univ. of Redlands	-
<hr/>				
*UCGIS		UCGIS, 2003		**NCGIA

14

NY

UC

6

8 Web 1 6

2.2 地理情報科学教育システムの概要

14 2

GIS

14 5 GIS

GIS

BS, Minor: GIS

BS Degree – Emphasis in GIScience

BE in Spatial

Information Engineering

GIS

Undergraduate Certificate in GIS NY

GIS

Certificate in GIS and Cartography

Certificate

14 8 GIS

GIS

Master of Advanced Study degree in GIS

GIS

Master of Applied Geography, Minor: GIS

MS Degree – Concentration in

GIScience

NY

GIS

Masters degree/PhD degree in Geography with Specialization

in GIS

Spatial Information

Science and Engineering

MS

PhD

GIS

International MS in GIS

GIS

Master of GIS

NJ

GIS

UC

表2 北米大学14校の地理情報科学カリキュラム

大学 (日本語) (英語)	アリゾナ州立大学	カリフォルニア州立大学 ポモナ校	ルイジアナ 州立大学	ニューメキシコ 州立大学	オハイオ州立大学
	Arizona State Univ.	California State Polytechnic Univ. at Pomona	Louisiana State Univ.	New Mexico State Univ.	Ohio State Univ.
特派員学生	奈良 温(博士1年)	—	—	—	—
学科など (日本語) (英語)	地理学科 Dept. of Geography	地理・人類学科 Dept. of Geography and Anthropology	地理・人類学科	地理学科 Dept. of Geography	地理学科 Dept. of Geography
URL	geography.asu.edu/	www.class.csupomona.edu/ ga/	www.ga.lsu.edu/	www.nmsu.edu/~geoweb/	www.geography.ohio- state.edu/
学部学位/修了証書 (地理情報科学関連)	GIS修了証明書	—	—	BS(GIS副専攻)	—
学部カリキュラム (地理情報科学関連)	地理情報科学に重点をおく プログラムを提供.	GISを主専攻とするプログラ ムを提供.	—	GISを副専攻とするプログ ラムを提供.	空間分析手法に重点をおく プログラムを提供.
大学院学位/修了証書 (地理情報科学関連)	MAS (GIS) GIS修了証明書	—	—	Master of Applied Geography(GIS副専攻)	—
大学院カリキュラム (地理情報科学関連)	地理情報科学に重点をおく プログラムを提供.	—	—	GISを副専攻とするプログ ラムを提供.	空間分析手法に重点をおく プログラムを提供.
地理系と情報系の連携	GIS修了証明カリキュラム において、地理系と情報系 学科のコースを提供.	GIS修了証明カリキュラム において地理系と情報系を 含むコースを提供.	—	—	—
GIS/地理情報科学 修了証明プログラム	GIS修了証明 (学部・大学院)	GIS修了証明	—	—	—
必修科目 (地理系)	(学部カリキュラム) GCU 495 Quantitative Methods in Geography GPH 370 Geographic Information Technologies GPH 373 Geographic Information Science I GPH 473 Geographic Information Science II (Capstone course)	Fundamentals of GIS GIS for Local Planning GIS Project Management GPS Using ArcPad Spatial Analysis with GIS	—	—	—
必修科目 (情報系)	(学部カリキュラム) CSE 100 Principles of Programming with C++	Programming for GIS	—	—	—

表2 北米大学14校の地理情報科学カリキュラム（続き）

大学 (日本語) (英語)	アリゾナ州立大学	カリフォルニア州立大学 ポモナ校	ルイジアナ 州立大学	ニューメキシコ 州立大学	オハイオ州立大学
	Arizona State Univ.	California State Polytechnic Univ. at Pomona	Louisiana State Univ.	New Mexico State Univ.	Ohio State Univ.
選択科目 (地理系)	(学部カリキュラム) GCU 361 Urban Geography GCU 441 Economic Geography GCU 442 Geographical Analysis of Transportation GCU 484 Internship GPH 371 Introduction to Cartography and Georepresentation GPH 372 Air Photo Interpretation GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization GPH 481 Environmental Geography GPH 483 Geographic Information Analysis GPH 484 Three credit hour GIS-based internship	—	—	—	—
選択科目 (情報系)	(学部カリキュラム) CSE 181 Applied Problem Solving with Visual Basic	—	—	—	—
備考	GIS修了証明カリキュラム のコースは、地理学科、コ ンピュータ科学学科、植物 生物学科の科目を提供。大 学院カリキュラムのウェブ 情報なし。	GIS修了証明カリキュラム はextended universityで提 供 (www.ceu.csupomona.edu/ certs/gis.asp)。 地理系、情報系科目は任 意に分類。 地理情報科学研究センター (<a href="http://www.csupomona.edu/~cgis
r/">www.csupomona.edu/~cgis r/)を有する。	—	—	—

表2 北米大学14校の地理情報科学カリキュラム (続き)

大学 (日本語) (英語)	オハイオ州立大学 Ohio State Univ.	ペンシルバニア州立大学 Pennsylvania State Univ.	ニュージャージー州立大学 ラトガース校 Rutgers, The State Univ. of New Jersey	サンディエゴ州立大学 San Diego State Univ.	ブリティッシュ・コロンビア大学 Univ. of British Columbia
特派員学生	—	—	—	濱田由紀(博士1年)	岩田 央(修士1年)
学科など (日本語) (英語)	土木・環境工学・測地科学 学科 Dept. of Civil & Environmental Engineering & Geodetic Science	地理学科 Dept. of Geography	リモートセンシング・空間分 析センター Center for Remote Sensing and Spatial Analysis (CRSSA)	地理学科 Dept. of Geography	地理学科 Dept. of Geography
URL	www-ceg.eng.ohio- state.edu/	www.geog.psu.edu/	www.crssa.rutgers.edu/	geography.sdsu.edu/	www.geog.ubc.ca/departme nt/
学部学位/修了証書 (地理情報科学関連)	—	—	—	BS(地理情報科学に重点)	—
学部カリキュラム (地理情報科学関連)	ジオマティクス工学プログ ラムを提供.	地理情報科学に重点をおく プログラムを提供.	—	地理情報科学に重点をおく プログラムを提供.	地理情報科学関連講義を 提供.
大学院学位/修了証書 (地理情報科学関連)	—	Master of GIS	地理情報科学修了証明	MS(地理情報科学に重点)	—
大学院カリキュラム (地理情報科学関連)	測地科学と測量プログラム を提供.	オンラインのGIS修士号カリ キュラムを提供.	地理情報科学修了証明の カリキュラム	地理情報科学に重点をおく 修士課程を提供. 博士課程 はカリフォルニア大学サン タバーバラ校との連携プロ グラム.	Geographical Analysis研究 クラスターを提供.
地理系と情報系の連携	—	—	地理情報科学修了証明カリ キュラムにおいて地理系と 情報系を含むコースを提 供.	地理情報科学修了証明カリ キュラムは、地理学科とコ ンピュータ科学学科の連携 プログラム.	UBC リモートセンシングカ ウンシルにおいて地理系と 情報系を含む研究環境を 大学院レベルで提供.
GIS/地理情報科学 修了証明プログラム	—	GIS修了証明 (学部修了後カリキュラム)	地理情報科学修了証明 (大学院)	地理情報科学修了証明	—
必修科目 (地理系)	—	GEOG 482 Nature of Geographic Information (OR GEOG 496) GEOG 483 Problem Solving with GIS GEOG 484 GIS Database Development GEOG 496 Independent Study (OR GEOG 482)	01:450:355 Principles of Cartography 01:960:401 Basic Statistics for Research (or equivalent) 34:970:592 Topics in Geographic Information Science 選択必修科目: 01:450:321 GIS 34:970:591 Introduction to GIS for Planning 11:372:362 Intermediate Environmental Geomatics	選択式必修科目: 381 - Computerized Map Design 484 - GIS (Required) 488 - Remote Sensing of the Environment 581 - Cartographic Design 583 - Internet Mapping and Distributed GIServices 584 - GIS Applications 585 - Quantitative Methods in Geographic Research 588 - Intermediate Remote Sensing of the Environment 596 - Advanced Topics in GIScience	—
必修科目 (情報系)	—	—	01:198:111 Introduction to Computer Science CRSSAの科目: 16:450:615 Seminar in Remote Sensing 01:372:371 Introduction to Aerial Photo Interpretation 16:455:501 Seminar in Geospatial Information Science	選択式必修科目: 105 - Visual Basic Programming 107 - Introduction to Computer Programming (Required) 108 - Intermediate Computer Programming (Required) 220 - UNIX and the C Programming Language 310 - Data Structures 320 - Programming Languages 503 - Scientific Database Techniques 514 - Database Theory and Implementation 520 - Advanced Programming Languages 535 - Object-Oriented Programming and Design 551 - User Interface Environments 575 - Super Computing for the Sciences 596 - Advanced Topics in Geocomputation 614A - Spatial Databases 689 - Scientific Visualization	—

表2 北米大学14校の地理情報科学カリキュラム (続き)

大学 (日本語) (英語)	オハイオ州立大学	ペンシルバニア州立大学	ニュージャージー州立大学 ラトガース校	サンディエゴ州立大学	ブリティッシュ・ コロンビア大学
選択科目 (地理系)	-	GEOG 485 GIS Programming and Customization GEOG 486 Cartography and Visualization GEOG 487 Environmental Applications of GIS GEOG 488 Acquiring and Integrating Geospatial Data GEOG 497K GIS For Analysis Of Health GEOG 583 Geospatial System Analysis and Design GEOG 584 Geospatial Technology Project Management GEOG 586 Geographical Information Analysis GEOG 597 Special Topics	16:450:605:04 Land Change Science 16:450:617 Seminar in Remote Sensing of the Biosphere 16:712:615 Geophysical Data Analysis	-	-
選択科目 (情報系)	-	-	16:194:601 Information and Communication Processes 16:198:535 Pattern Recognition and Theory 16:198:541 Database Systems 16:332:484/560 Introduction to Computer Graphics 16:375:551 Remote Sensing of the Ocean and Atmosphere 17:610:557 Database Design & Management	-	-
備考	-	-	地理情報科学修了証明カリキュラムの関連学科は人類学、生態学・進化学科、環境学科、地理学科、都市計画・政策学科を含む。	地球システム分析研究センター、画像処理・GISセンター、自然地理学ラボ、地学、製図学、気象学、リモートセンシング、社会科学研究ラボ(社会科学専門データと分析機能を提供)の研究施設を有する。	その他、資源管理環境学科(大学院)、林学科(学部・大学院)、ランドスケープアーキテクチャ(大学院)にてGIS関連講義を提供。

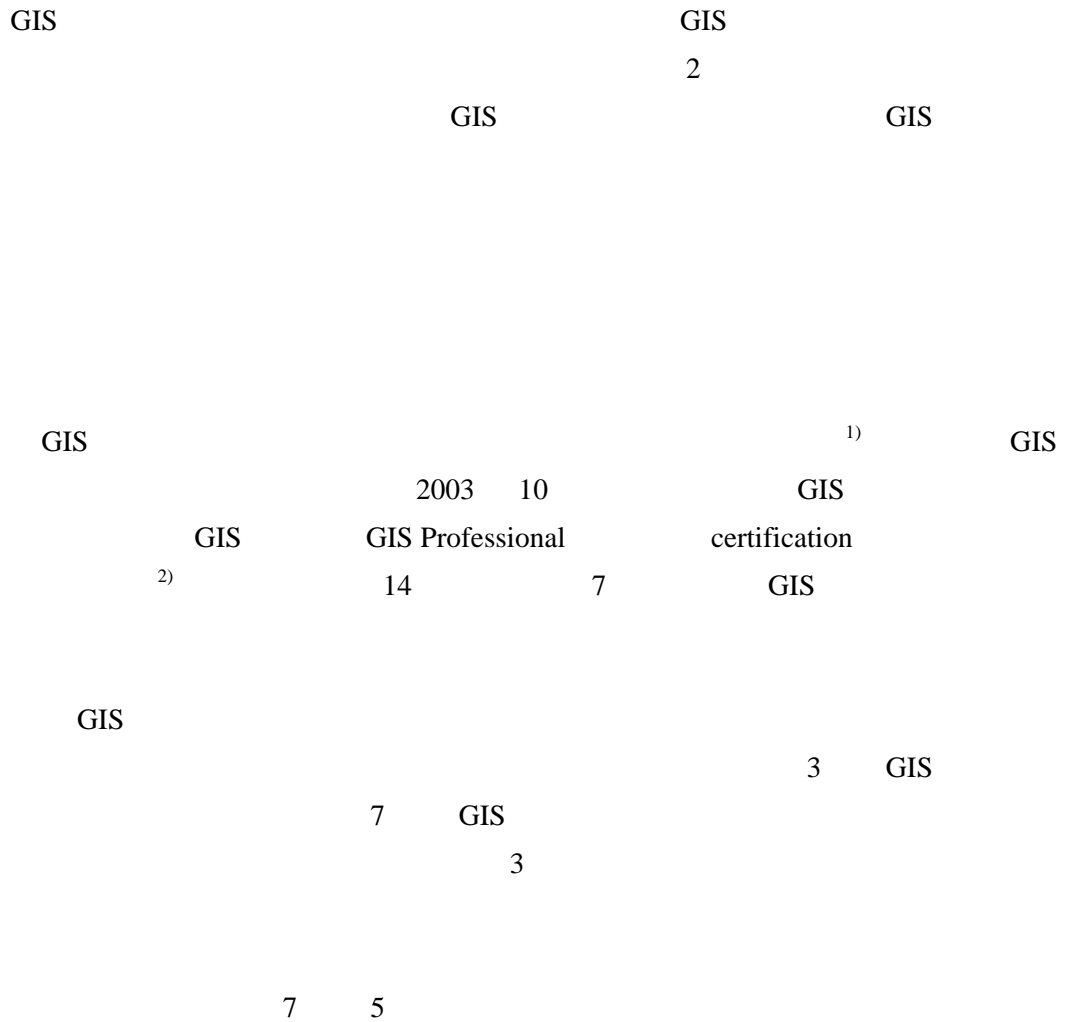
表2 北米大学14校の地理情報科学カリキュラム（続き）

大学 (日本語)	NY州立大学 バッファロー校	UCサンタバーバラ校	メイン大学	オレゴン大学	レッドランズ大学
(英語)	Univ. at Buffalo, The State Univ. of New York	Univ. of California, Santa Barbara	Univ. of Maine	Univ. of Oregon	Univ. of Redlands
特派員学生	江崎亮介(修士1年)	山崎裕太郎(修士1年)	倉田陽平(博士4年)	—	—
学科など (日本語)	地理学科	地理学科	空間情報理工学科	地理学科	—
(英語)	Dept. of Geography	Dept. of Geography	Dept. of Spatial Information Science and Engineering	Dept. of Geography	—
URL	www.geog.buffalo.edu/	www.geog.ucsb.edu/	spatial.umaine.edu/	geography.uoregon.edu/	www.institute.redlands.edu/ msgis/
学部学位/修了証書 (地理情報科学関連)	GIS&地図学修了証明書	—	BE(空間情報工学)	—	—
学部カリキュラム (地理情報科学関連)	GISと地図学を主専攻とするプログラムを提供.	GISを含む地理技術分野を提供.	情報システム工学プログラム、空間・時空間情報を扱う講義を提供.	地理情報科学に重点をおくプログラムを提供.	—
大学院学位/修了証書 (地理情報科学関連)	MA(GIS) MS(GIS&地理情報科学) PhD(GIS&地理情報科学)	—	MS(空間情報理工学) PhD(空間情報科学)	—	MS(GIS)
大学院カリキュラム (地理情報科学関連)	GISと地理情報科学を主専攻とするプログラムを提供.	GISを含むモデリング・計測・コンピュータ分野を提供.	空間情報学に関する5分野を提供. ①空間現象の形式的表象, ②画像解析, ③データベースシステム, ④地理情報システム, ⑤情報政策.	—	地理情報解析・管理に集中したプログラムを提供.
地理系と情報系の連携	学部のGIS&地図学修了証明カリキュラムと大学院(博士課程)の地理情報科学修了証明カリキュラムにおいて地理系と情報系のコースを提供.	—	—	—	MSカリキュラムで地理系と情報系の科目を提供.
GIS/地理情報科学 修了証明プログラム	地理情報科学修了証明(大学院)	—	GIS修了証明(大学院)	—	—
必修科目 (地理系)	GEO 591 Introduction to Geographic Information Science GEO 595 Database Design for GIS (または CSE 562)	—	—	—	—
必修科目 (情報系)	CSE 562 Database Systems (またはGEO 595)	—	SIE 509 – Principles of GIS SIE 510 – GIS Applications SIE 550 – Engineering Databases and Information Systems	—	—

表2 北米大学14校の地理情報科学カリキュラム (続き)

大学 (日本語)	NY州立大学 バッファロー校	UCサンタバーバラ校	メイン大学	オレゴン大学	レッドランズ大学
(英語)	Univ. at Buffalo, The State Univ. of New York	Univ. of California, Santa Barbara	Univ. of Maine	Univ. of Oregon	Univ. of Redlands
選択科目 (地理系)	GEO 592 Graphic Cognition & Cognitive Geography GEO 555 GIS: Algorithms and Data Structures GEO 593 Computational Geography GEO 597 Geostatistics GEO 605 Spatial Statistics GEO 528 Geography and Society Theory GEO 594 Geographic Information and Society GEO 520 Transportation Models/GIS GEO 586 Spatial Decision Support Systems GEO 605 Spatial Statistics GEO 559 GIS & Environmental Modeling GEO 597 Geostatistics GEO 502 Survey Methods for Human Geographers GEO 655 Adv.Topics in GIS: The Art of Writing Grant Proposals GEO 800 The Art of Teaching	—	—	—	—
選択科目 (情報系)	CSE 514 Vision — CSE 526 Image Processing CSE 573 Introduction to Computer Vision and Image Processing CSE 572 Knowledge Based Artificial Intelligence CSE 575 Introduction to Cognitive Science CSE 581 Computational Geometry CSE 634 Multimedia Data Processing Systems	—	SIE 512 – Spatial Analysis — SIE 525 – Information Systems Law SIE 534 – Digital Image Processing SIE 536 – Remote Sensing SIE 551 –GIS User Interface Design SIE 553 – Geometry for GIS SIE 555 – Spatial Database Systems SIE 556 – Information System Architecture SIE 560 – Spatio-Temporal Data Modeling SIE 565 – Reasoning w/Uncertainty in Spatial Information Systems	—	—
備考	地理情報科学修了証明カリ キュラムの関連学科は人類 学科, 地理学科, 地質学 科, 土木学科, コンピュータ 科学・工学科, 産業工学 科, 哲学科の7つ.	—	—	学際的な地理情報科学教 育環境を提供.	地理系, 情報系科目は任 意に分類.

2.3 GIS 修了証明プログラムおよび地理系と情報系の連携



¹ URISA: Urban and Regional Information Systems Association

Web GIS http://www.urisa.org/Career_center/college_certif_programs.htm

² GIS certificate certification <http://www.gisci.org/certificationprogramdescription.htm> certificate

3 GIS

7

	* UC *NJ *NY	*	
	* *NJ *NY	*	

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3

2

3)

UC

6

GIS

GIScience

GIScience I, II

NY

Introduction to GIScience

NJ

Topics in GIScience

Advanced topics in GIScience

GIS

NJ

GIScience

Geospatial Information Science

geospatial

Acquiring and integrating geospatial data

Geospatial system analysis and design Geospatial technology project management NJ

Seminar in Geospatial Information Science

NJ

geomatics

Intermediate Environmental Geomatics

3

joint program

4)

4 GIS

GIS

4 GIS

	<p>Quantitative methods in geography (ASU) Geographical analysis of transportation (ASU) Geographic information analysis (ASU) Quantitative methods in geographic research (SDSU) GIS for analysis of health (PSU) Geospatial system analysis and design (PSU) Geographical information analysis (PSU) Geophysical data analysis (Rutgers) Geostatistics (Buffalo) Spatial statistics (Buffalo)</p>	<p>Spatial analysis (Maine) Spatio-temporal data modeling (Maine) Reasoning with uncertainty in spatial information systems (Maine)</p>
<p>GIS GIScience</p>	<p>GIScience I (ASU) GIScience II (ASU) Three credit hour GIS-based internship (ASU) GIS (Rutgers) GIS (SDSU) GIS applications (SDSU) Advanced topics in GIScience (SDSU) Environmental applications of GIS (PSU) Introduction to GIScience (Buffalo)</p>	<p>Principles of GIS (Maine) GIS applications (Maine)</p>

	GIS programming and customization (PSU)	Principles of programming with C++ (Arizona) Applied problem solving with visual basic (ASU) Visual basic programming (SDSU) Introduction to computer programming (SDSU) Intermediate computer programming (SDSU) UNIX and the C programming language (SDSU) Programming languages (SDSU) Advanced programming languages (SDSU) Object-oriented programming and design (SDSU)
	GIS database development (PSU) Database design for GIS (Buffalo)	Scientific database techniques (SDSU) Database theory and implementation (SDSU) Spatial databases (SDSU) CSE Database systems (Buffalo) Engineering databases and information systems (Maine) Spatial database systems (Maine)
	Introduction to cartography and georepresentation (ASU) Geographics: interactive and animated cartography and geovisualization (ASU) Principles of cartography (Rutgers) Computerized map design (SDSU) Cartographic design (SDSU) Cartography and visualization (PSU)	Scientific visualization (SDSU)
	Remote sensing of the environment (SDSU) Intermediate remote sensing of the environment (SDSU) Seminar in remote sensing of the biosphere (Rutgers)	Seminar in remote sensing (Rutgers) Remote sensing of the ocean and atmosphere (Rutgers) Remote sensing (Maine)

PSU

Rutgers NJ

ASU

SDSU

Maine

3. おわりに

GIS
GIS

14

GIS

GIS

謝辞

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A

17200052

Ming-Hsiang Tsou

参考文献

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- Goodchild, M. F. and Kemp, K. K., eds. 1990 *NCGIA Core Curriculum in GIS*. Santa Barbara, California: National Center for Geographic Information and Analysis, University of California, Santa Barbara.
- NCGIA (National Center for Geographic Information & Analysis). 1997 *NCGIA Core Curriculum 1990 Version*. <http://www.geog.ubc.ca/courses/klink/gis.notes/ncgia/toc.html>
- NCGIA (National Center for Geographic Information & Analysis). 2000 *The NCGIA Core Curriculum in GIScience*. <http://www.ncgia.ucsb.edu/giscc/>
- UCGIS (University Consortium for Geographic Information Science) (2003) *The Strawman Reporti*. (http://www.ucgis.org/priorities/education/DB/Upload/MC_Strawman_June03.pdf)

資料 1 特派員学生による地理情報科学カリキュラム調査

資料 1-1 アリゾナ州立大学（奈良 温）

アリゾナ州立大学 Arizona State University

2005 12 22

特派員学生

1

E-mail atsushi.nara@asu.edu

Name: Atsushi Nara

Department and/or school name:

College of Liberal Art and Science, Department of Geography

Grade: Ph.D. – 1st

1. 地理学部

Department of Geography

<http://geography.asu.edu/>

1.1 学科の概要

<http://geography.asu.edu/>

6

(<http://geography.asu.edu/education/>)

1

GIS

(: <http://geography.asu.edu/research/>)

Decision Center for a

Desert City (DCDC <http://dcdc.asu.edu/>)

Phoenix

The

National Science Foundation (NSF) \$6.9Million

Co-

Director Dr. Gober (HP: <http://geography.asu.edu/gober/>)

GIS Team

1.2 カリキュラムの概要

(<http://www.asu.edu/aad/catalogs/general/department-geography.html>)

Bachelor of Art (BA) Bachelor of Science (BS)

GIS

Certificate in Geographic Information Science

BA BS

45

C

- Bachelor of Art -

37

18

Upper-division

Core Geographic Knowledge (10-11) Core Geographic Skills

(12) a regional course (3)

12

Core Geographic Knowledge (10-11)		
GCU 102	Introduction to Human Geography SB	3
GCU 121	World Geography* SB, G	4
GPH 111	Introduction to Physical Geography SQ or GPH 411 Physical Geography (3)	4
Core Geographic Skills (12)		
GCU 495	Quantitative Methods in Geography CS	3
GCU 496	Geographic Research Methods L	3
GPH 371	Introduction to Cartography and Georepresentation CS	3
GPH 491	Geographic Field Methods	3
Geographic Region (3) Choose one of the courses below, in consultation with an advisor.		
GCU 322	Geography of U.S. and Canada SB, C	3
GCU 323	Geography of Latin America SB, G	3
GCU 325	Geography of Europe SB, G	3
GCU 326	Geography of Asia SB, G	3
GCU 327	Geography of Africa SB, G	3
GCU 328	Geography of Middle East and North Africa SB, G	3
GCU 332	Geography of Australia and Oceania SB, G	3
GCU 344	Geography of Hispanic Americans SB, C	3
GCU 421	Geography of Arizona and Southwestern United States SB, C	3
GCU 423	Geography of South America SB, G	3
GCU 424	Geography of Mexico and Middle America SB, G	3
GCU 425	Geography of the Mexican American Borderland L/SB, G	3
GCU 426	Geography of Russia and Surroundings SB, G	3
GCU 433	Geography of Southeast Asia	3
GCU 433	Alpine and Arctic Environments G	3

*

L	Literacy and critical inquiry
MA	Mathematics
CS	Computer/statistics/quantitative
HU	Humanities and fine arts
SB	Social and behavioral science
SQ	Natural science quantitative
SG	Natural Science general
C	Cultural Diversity in the US
G	Global awareness
H	Historical awareness

- Bachelor of Science -

37	18	Upper-division
	Core Geographic Knowledge (10-11)	Core Geographic Skills
(12)	Core Geographic Techniques (3-4)	12

Core Geographic Knowledge (10-11)	
GCU 102 Introduction to Human Geography SB	3
GCU 121 World Geography* SB, G	4
GPH 111 Introduction to Physical Geography SQ or GPH 411 Physical Geography (3)	4
Core Geographic Skills (12)	
GCU 495 Quantitative Methods in Geography CS	3
GCU 496 Geographic Research Methods L	3
GPH 371 Introduction to Cartography and Georepresentation CS	3
GPH 491 Geographic Field Methods	3
Core Geographic Techniques (3-4) Choose one of the courses below, in consultation with an advisor.	
GPH 372 Air Photo Interpretation	3
GPH 373 Geographic Information Science I CS	4
GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization CS	3

- Undergraduate certificate in Geographic Information Science -

16	3	19	C	Certificate in
GIS				

Required courses (16)	
CSE 100 Principles of Programming with C++ CS or CSE 110 Principles of Programming with Java CS (3)	3
GCU 495 Quantitative Methods in Geography CS	3
GPH 370 Geographic Information Technologies CS	3
GPH 373 Geographic Information Science I CS	4
GPH 473 Geographic Information Science II CS	3
Elective Courses (3) Choose one of the courses below	
ABS 485 GIS in Natural Resources	3
ABS 586 Remote Sensing in Environmental Resources	4
CSE 181 Applied Problem Solving with Visual BASIC CS	3
GCU 361 Urban Geography SB	3
GCU 441 Economic Geography SB	3
GCU 442 Geographical Analysis of Transportation SB	3
GCU 484 Human Geography Internship (A GIS-based internship may be taken.)	3
GPH 371 Introduction to Cartography and Georepresentation CS	3
GPH 372 Air Photo Interpretation	3
GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization CS	3
GPH 481 Environmental Geography	3
GPH 483 Geographic Information Analysis	3
GPH 484 Internship: GIS based	3
PLB 434 Landscape Ecological Analysis and Modeling	3

Doctor of Philosophy in Geography

Master of Art in Geography

Master of Advanced Study in Geographic Information Systems

- Master of Art -

30 24
B
GCU 529 (Geographic Thought and Theory) GCU 585 (Advanced Research
Methods) 3 (GCU/GPH 591) 1 (GCU/GPH
599) 6 Written Comprehensive Examination
() Oral Thesis Defense ()

- Doctor of Philosophy -

54 (84)
B GCU 529 (Geographic Thought and
Theory) GCU 585 (Advanced Research Methods) 3 (GCU/GPH 591)
2 24 (18 : GCU/GPH 799)
Departmental Research and Field Examination
Written Comprehensive Examination () Oral Dissertation Defense ()
() Departmental Research and Field Examination
2

- -
GCU 529: Contemporary Geographic Thought. (3) Fall
Comparative evaluation of current philosophy concerning the nature and trends of geography.

GCU 585: Advanced Research Methods in Geography. (3) Spring
Specialized research techniques and methodologies in economic, political, or cultural geography.

GCU/GPH 591: Seminar. (1–3) Fall, Spring, Summer
Selected topics in economic, political, or cultural geography. Field trips may be required.

科目名、概要	单位	学期
GPH 271 Maps and Map Reading Map types, uses, limitations, and evolution. Communication via paper and digital medium. Navigation, interpretation, projections, sources, symbols, classification, case, handling.	3	once a year
GPH 370 Geographic Information Technologies Introduction to modern geographic information technologies, including cartography, GIS, remote sensing, global positioning systems, and statistical analyses. Lecture, lab.	3	fall and spring
GPH 371 Introduction to Cartography and Georepresentation Study and creation of maps. Fundamental mapping principles (projection, scale, generalization, symbolization) and computer-based cartographic production. Lecture, lab.	3	selected semesters
GPH 372 Air Photo Interpretation Subset, remote sensing, includes: photography, films, aerial geometry, image components, stereoscopy, photogrammetry, ground truthing, interpret physical, cultural, economic, intelligence information.	3	once a year
GPH 373 Geographic Information Science I History and basic aspects of GIS including map and data file structure, conversions, and synthesis with a computerized environment.	3	fall
GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization Advanced cartography, stressing influence and application of the computer on geographic representation. Emphasizes creation of maps for the Internet. Lecture, lab.	3	selected semesters
GPH 473 Geographic Information Science II GIS as a basis for microcomputer spatial analysis and synthesis. Includes digitizing, database organization, spatial retrieval, and graphics.	3	fall and spring
GPH 483 Geographic Information Analysis Basics of spatial data analysis. Topics include point pattern analysis, spatial autocorrelation, spatial regression, and kriging. Fee. Lecture, lab.	3	fall
GPH 491 Geographic Field Methods Field techniques, including use of aerial photos, large-scale maps, and fractional code system of mapping; urban and rural field analysis to be done off campus.	3	spring and summer
GPH 573 Geographic Information Science III In-depth look at programming within GIS. Focuses on programming and methodology, utilizing specific software, and basic scientific computing. Lecture, lab.	3	spring
GPH 575 Geographic Applications of Remote Sensing Uses imaging and nonimaging methods of remote acquisition of data, including satellite sensors, airborne radar, multiband scanning, conventional photographic sensors, and ground-based equipment. Required field trips.	3	not regularly offered
GPH 596 Advanced Spatial Statistics Multivariate and advanced statistical techniques including Box-Jenkins modeling and spectral analysis. Project papers and presentations required. Seminar.	3	spring
GCU 495 Quantitative Methods in Geography Statistical techniques applied to the analysis of spatial distributions and relationships. Introduction to models and theory in geography.	3	fall and spring
GCU 496 Geographic Research Methods Scientific techniques used in geographic research.	3	fall and spring

1.3 地理情報科学関連の教員

Richard Aspinall

Robert Balling

HP: <http://geography.asu.edu/balling/index.html>

Michael Kuby

HP: <http://geography.asu.edu/mkuby/>

Elizabeth Wentz

Rob Edsall

HP: <http://www.public.asu.edu/~redsall/>

Chris Lukinbeal

HP: <http://geography.asu.edu/lukinbeal/>

Paul Torrens

HP: <http://www.geosimulation.org/geosim/about.htm>

資料 1-2 サンディエゴ州立大学（濱田由紀）

サンディエゴ州立大学
San Diego State University

2005 12 30

特派員学生

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E-mail yhamada@rohan.sdsu.edu

Name: Yuki Hamada

Department and/or school name: Department of Geography

Grade: Ph.D. – 1st

1. 地理学部

Department of Geography
<http://geography.sdsu.edu>

1.1 学科の概要

<http://coursecat.sdsu.edu/bulletin/GEOG.pdf>

GIS

(a)

(b)

(University of California, Santa Barbara)

Stephen and

Mary Birth Center for Earth System Analysis Research (CESAR)
Geographic Information Systems (GIS)

23

28

60

1.2 カリキュラムの概要

2004 (GIScience)
Geography 101 101L 102 7

27 Upper Division

3

(a) Geography321-336; (b)353-354, 554-559, 585-586; (c) 370, 378, 483, 570-577;
(d) 378, 401, 409, 540-511; (e) 380-381; (f)385, 484, 488, 581-588

9

(a) : Geography378, 401, 409, 504-511; (b) : 370, 378, 570-575; (c)
: 353-354. 385, 554-559, 585-586; (d) : 380-385, 484, 488,
581-588; (e) : 354, 554

Geography 101 101L 102 7

33

35

Geography 381 385 484 488 585 Upper Division
Geography 483 581-595 6 Geography370 378 401 409 504-511 570-575
9 Geography353-358 554-559 3 CS310 320
3 37 Upper Division

Lower Division Courses

Undergraduate Courses

GEOG101	Principals of Physical Geography	3
GEOG101L	Physical Geography Laboratory	1
GEOG102	Principals of Cultural Geography	3
GEOG103	Weather and Climate	3
GEOG106	World Regional Geography	3
GEOG296	Experimental Topics	1-4

Upper Division Courses

Undergraduate Courses

GEOG312	Cultural Worlds	3
GEOG321	United States	3
GEOG323	Middle America	3
GEPG324	South America	3
GEOG336	Europe	3
GEOG353	Location of Economic Activity	3
GEOG354	Geography of Cities	3
GEOG370	Environmental and Natural Resource Conservation	3
GEOG378	Environmental Geomorphology	3
GEOG380	Map Investigation	3
GEOG381	Computerized Map Design	3
GEOG401	Geomorphology	3
GEOG409	Global Climate Change	3
GEOG385	Spatial Data Analysis	3
GEOG483	Watershed Analysis	3
GEOG484	Geographic Information Systems	3
GEOG488	Remote Sensing of Environment	4
GEOG495	Geography Capstone	1
GEOG496	Selected Studies in Geography	3
GEOG498	Senior Thesis	3
GEOG499	Special Study	1-3

**Upper Division Courses
(Also Acceptable for Advanced Degree)**

GEOG504	Coastal and Submarine Geomorphology	3
GEOG505	Fluvial Geomorphology	3
GEOG507	Geography of Natural Vegetation	3
GEOG508	Environmental Climatology	3
GEOG509	Regional Climatology	3
GEOG511	Hydroclimatology	3
GEOG554	World Cities: Comparative Approaches to Urbanization	3
GEOG556	Location and Spatial Structure of Cities	3
GEOG559	Urban Transportation Geography	3
GEOG570	Environmental Resource Conservation	3
GEOG572	Land Use Analysis	3
GEOG573	Population and the Environment	3
GEOG574	Water Resources	3
GEOG575	Geography of Recreational Land Use	3
GEOG581	Cartographic Design	3
GEOG583	Internet Mapping and Distributed GIServices	3
GEOG584	Geographic Information Systems Applications	3
GEOG585	Quantitative Methods in Geographic Research	3
GEOG586	Qualitative Methods in Geographic Research	3
GEOG588	Intermediate Remote Sensing of Environment	4
GEOG595	Geographic Internship	3
GEOG596	Advanced Topics in Geography	1-3

- Master of Art in Geography
- Master of Science in Geography (GIScience emphasis)
- Doctor of Philosophy in Geography (conjunction with UCSB)

30
24

18 600 700

7

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Geographic Information Science

30

6 15 600 700

15 :

Geography581-585, 588, 683-688L, 780

University of California, Santa

Barbara

Systematic area

Development of skills in spatial techniques

	Urban and regional analysis	
Comparative Urbanization and spatial structures	Urban structure Social and critical geography	Social

	Biogeography and landscape ecology
Physical climatology	

GIS

Qualifying Examinations

**Upper Division Courses
(Also Acceptable for Undergraduate Degree)**

GEOG504	Coastal and Submarine Geomorphology	3
GEOG505	Fluvial Geomorphology	3
GEOG507	Geography of Natural Vegetation	3
GEOG508	Environmental Climatology	3
GEOG509	Regional Climatology	3
GEOG511	Hydroclimatology	3
GEOG554	World Cities: Comparative Approaches to Urbanization	3
GEOG556	Location and Spatial Structure of Cities	3
GEOG559	Urban Transportation Geography	3
GEOG570	Environmental Resource Conservation	3
GEOG572	Land Use Analysis	3
GEOG573	Population and the Environment	3
GEOG574	Water Resources	3
GEOG575	Geography of Recreational Land Use	3
GEOG581	Cartographic Design	3
GEOG583	Internet Mapping and Distributed GIServices	3
GEOG584	Geographic Information Systems Applications	3
GEOG585	Quantitative Methods in Geographic Research	3
GEOG586	Qualitative Methods in Geographic Research	3
GEOG588	Intermediate Remote Sensing of Environment	4
GEOG595	Geographic Internship	3
GEOG596	Advanced Topics in Geography	1-3

Graduate Courses

GEOG670	Environmental and Resource Conservation Theory	3
GEOG683	Advanced Geographic Information Systems	3
GEOG683L	Geographic Information Systems Laboratory	1-2
GEOG685	Advanced Quantitative Methods in Geography	3
GEOG688	Advanced Remote Sensing	3
GEOG688L	Advanced Remote Sensing Laboratory	1-2
GEOG696	Advanced Special Topics in Geography	3
GEOG700	Seminar in Geographic Research Design	3
GEOG701	Seminar in Development of Geographic Thought	3
GEOG740	Seminar in Human Geography	3
GEOG760	Seminar in Behavioral and Social Geography	3
GEOG770	Seminar in Environmental and Resource Conservation	3
GEOG780	Seminar in Techniques of Spatial Analysis	3
GEOG797	Research	1-3
GEOG798	Special Study	1-3
GEOG799A	Thesis	3
GEOG799B	Thesis Extension	0
GEOG890	Independent Study for Doctoral Examination	1-9
GEOG897	Doctoral Research	1-15
GEOG899	Doctoral Dissertation	1-15

1.3 学部カリキュラムの講義概要（大学院と共通の講義はその旨明記）

GEOG101 Principals of Physical Geography 3

Molly Pohl-Costello Alan Osborn Jane Thorngren

GEOG101L Physical Geography Laboratory 1
GEOG101

GEOG102 Principals of Cultural Geography 3

Stuart C. Aitken Alan Osborn

GEOG385 Spatial Data Analysis 3
GEOG101 GEOG102 STAT 205

Li An

GEOG103 Weather and Climate 3
Weather disturbances

Edward Aguado

GEOG106 World Regional Geography 3

Fred Wildes

GEOG296 Experimental Topics 1-4

GEOG296, 496, 596

9

John O'Leary

GEOG312 Cultural Worlds 3

Foundations II B

Fernando Bosco Frederick P. Stutz

GEOG321 United States 3

Foundations II B

GEOG101

GEOG102

Alan Osborn Diana Richardson

GEOG323 Middle America 3

Foundations II B

GEOG101

GEOG102

Barbara E. Fredrich

GEPG324 South America 3

Foundations II B

GEOG101

GEOG102

Fred Wildes

GEOG336 Europe 3

Foundations II B

GEOG101

GEOG102

GEOG353 Location of Economic Activity 3

GEOG101

GEOG102

GEOG354 Geography of Cities 3
Foundations II B
GEOG101 GEOG102

Larry R. Ford James Chagala

GEOG370 Environmental and Natural Resource Conservation 3
Foundations II B

Jane Thorngren Diana Richardson

GEOG378 Environmental Geomorphology 3
GEOG101 MATH 121 150

GEOG380 Map Investigation 3
GEOG101 GEOG102

André Skupin

GEOG381 Computerized Map Design 3
GEOG101 GEOG102

Thematic GIS
Ming-Hsiang Tsou

GEOG401 Geomorphology 3
GEOG101

GEOG409 Global Climate Change (3)
GEOG101 GEOG103

Allen S. Hope

GEOG483 Watershed Analysis 3
GEOG101
watershed

Cristina Tague

GEOG484 Geographic Information Systems 3
GEOG380, 381, 488 3

GIS

Piotr Jankowski André Skupin

GEOG488 Remote Sensing of Environment 4
GEOG101
PHS 180A-180B

Douglas A. Stow

GEOG495 Geography Capstone 1
watershed Foundations II B

Division

Upper

GEOG496 Selected Studies in Geography 3
6
GEOG296, 496, 596 9

GEOG498 Senior Thesis 3
3.0

John F. O'Leary

GEOG499 Special Study 1-3
6
John F. O'Leary

GEOG504 Coastal and Submarine Geomorphology 3
GEOG101 MATH 121 150
Marine waves

Interpolation

GEOG505 Fluvial Geomorphology 3
Geography401

GEOG507 Geography of Natural Vegetation 3
Geography101

John F. O'Leary

GEOG508 Environmental Climatology 3
GEOG101 MATH 121 150
transfer Turbulent heat

GEOG509 Regional Climatology 3
GEOG103

Edward Aguado

GEOG511 Hydroclimatology 3
GEOG101 103 MATH 121 150

Allen S. Hope

GEOG554 World Cities: Comparative Approaches to Urbanization 3
Geography354

Larry R. Ford

GEOG556 Location and Spatial Structure of Cities 3
GEOG354 Upper Division 3

Fernando Bosco

GEOG559 Urban Transportation Geography 3
Upper Division Urban Transportation 3

Frederick P. Stutz

GEOG570 Environmental Resource Conservation 3
Geography370

Jane Thorngren

GEOG572 Land Use Analysis 3
Geography370

Diana Richardson

GEOG573 Population and the Environment 3
Geography102

John Weeks

GEOG574 Water Resources 3
Geography370

GEOG575 Geography of Recreational Land Use 3
Geography101 102

Diana Richardson

GEOG581 Cartographic Design 3
Geography381

André Skupin

GEOG583 Internet Mapping and Distributed GIServices 3
Geography381 484

Distributed GIS
Ming-Hsiang Tsou

GEOG584 Geographic Information Systems Applications 3
Geography484 585

GIS

GIS

GIS

Piotr Jankowski

GEOG585 Quantitative Methods in Geographic Research 3
Geography385

Sergio J. Rey Li An

GEOG586 Qualitative Methods in Geographic Research 3
Geography102

Stuart C. Aitken

GEOG588 Intermediate Remote Sensing of Environment 4
Geography385 488

Douglas A. Stow

GEOG595 Geographic Internship 3
Upper division 6

3

Diana Richardson

GEOG596 Advanced Topics in Geography 1-3
Upper division 6

GEOG296, 496, 596

9

GEOG596

6

1.4 大学院カリキュラムの講義概要（学部と共通の講義はその旨明記）

GEOG700 Seminar in Geographic Research Design 3

Christina Tague

GEOG701 Seminar in Development of Geographic Thought 3

Fernando Bosco

GEOG504, GEOG505, GEOG507, GEOG508, GEOG509, GEOG511, GEOG554, GEOG556,
GEOG559, GEOG570, GEOG572, GEOG573, GEOG574, GEOG575, GEOG581, GEOG583,
GEOG584, GEOG585, GEOG586, GEOG588, GEOG595, GEOG596

See 1.3

GEOG670 Environmental and Resource Conservation Theory 3

Molly Pohl-Costello

GEOG683 Advanced Geographic Information Systems 3
Geography484

GIS

Piotr Jankowski

GEOG683L Geographic Information Systems Laboratory 1-2
Geography683 t

GIS

GEOG685 Advanced Quantitative Methods in Geography 3
Geography585

Sergio J. Rey

GEOG688 Advanced Remote Sensing 3
Geography588
Thermal infrared

Douglas Stow

GEOG688L Advanced Remote Sensing Laboratory 1-2
Geography688 t

Thermal infrared

Douglas Stow

GEOG696 Advanced Special Topics in Geography 3

GEOG596 6

GEOG710 Seminar in Physical Geography (3)
Upper Division 6

6

Allen S. Hope Christina Tague

GEOG740 Seminar in Human Geography 3
Upper Division 6

6

Fernando Bosco

GEOG760 Seminar in Behavioral and Social Geography 3
Upper Division 6

/

/

6

John R. Weeks

GEOG770 Seminar in Environmental and Resource Conservation 3
Upper Division 6

/

6

GEOG780 Seminar in Techniques of Spatial Analysis	3	
Upper Division	6	
		GIS
	6	
Sergio J. Rey		Allen S. Hope
GEOG797 Research	1-3	
		6
John F. O'Leary		
GEOG798 Special Study	1-3	
		6
John F. O'Leary		
GEOG799A Thesis	3	
GEOG799B Thesis Extension	0	
Geography799A		RP
GEOG799A		
GEOG890 Independent Study for Doctoral Examination	1-9	
		9
Douglas A. Stow		
GEOG897 Doctoral Research	1-15	
		6
Douglas A. Stow		
GEOG899 Doctoral Dissertation	1-15	
Douglas A. Stow		

1.5 地理情報科学関連の教員

Email

Edward Aguado, Ph.D., Wisconsin (1983), Professor
Climatology, Meteorology, Hydrology, Physical Geography
M.A. Program Advisor
<http://geography.sdsu.edu/People/Faculty/aguado.html>

Stuart C. Aitken, Ph.D., Western Ontario (1985), Professor
Critical Geography, Qualitative Methods, Children, Families and Communities, Film
<http://geography.sdsu.edu/People/Faculty/aitken.html>

Li An, Ph.D., Michigan State University (2003), Assistant Professor
Landscape Ecology, Quantitative Methods, Populations
<http://geography.sdsu.edu/People/Faculty/an.html>

Fernando Bosco, Ph.D., The Ohio State University (2002), Assistant Professor
Urban Geography, social movements and collective action, social and cultural theory, economic
geography, Latin America
<http://geography.sdsu.edu/People/Faculty/bosco.html>

Larry R. Ford, Ph.D., Oregon (1970), Professor
Urban Design, Comparative Urbanization, Historic Preservation, Cultural Geography
On sabbatical Spring, 2005
<http://geography.sdsu.edu/People/Faculty/ford.html>

Allen S. Hope, Ph.D., Maryland (1986), Professor
Hydrology, Remote Sensing, Climatology, GIS, Spatial Modeling
<http://geography.sdsu.edu/People/Faculty/hope.html>

Piotr Jankowski, Ph.D., Washington (1989), Professor
Spatial Decision Support Systems, GIS, Water Resources
<http://geography.sdsu.edu/People/Faculty/jankowski.html>

John F. O'Leary, Ph.D., UCLA (1984), Professor
Biogeography, Physical Environmental Studies, Field Measurements and Quantitative Analysis
Department Chair
<http://geography.sdsu.edu/People/Faculty/oleary.html>

Molly Pohl-Costello, Ph.D., Arizona State (1999), Assistant Professor
Physical and Environmental Geography, Fluvial Geomorphology, Public Land and Water Policy
<http://geography.sdsu.edu/People/Faculty/pohl.html>

Sergio J. Rey, Ph.D., UC-Santa Barbara (1994), Professor
Urban and Regional Modeling, Spatial Econometrics, Economic Geography
<http://geography.sdsu.edu/People/Faculty/rej.html>

André Skupin, Ph.D., Buffalo (1998), Assistant Professor
Cartography, GIS, Information Visualization, Visual Data Mining
<http://geography.sdsu.edu/People/Faculty/skupin.html>

Douglas A. Stow, Ph.D., UC-Santa Barbara (1985), Professor
Remote Sensing and image processing, land-use and land-cover analyses, Arctic tundra, coastal, and semi-arid ecosystems
Ph.D. Program Advisor

<http://geography.sdsu.edu/People/Faculty/stow.html>

Christina Tague, Ph.D., University of Toronto (1999), Associate Professor
Environmental Simulation and Modeling, Hydrology, Forest Ecology

<http://geography.sdsu.edu/People/Faculty/tague.html>

Ming-Hsiang Tsou, Ph.D., University of Colorado (2001), Associate Professor
Internet Mapping/Cartography, Web-based GIS

<http://geography.sdsu.edu/People/Faculty/tsou.html>

John R. Weeks, Ph.D., UC-Berkeley (1972), Professor
Demography, Environment

<http://geography.sdsu.edu/People/Faculty/weeks.html>

Barbara E. Fredrich, Ph.D., UCLA (1975)
Latin America, Biogeography, Cultural Geography, Geographic Education

<http://geography.sdsu.edu/People/Faculty/fredrich.html>

Arthur Getis, Ph.D., Washington (1961)
Statistical Methods, Spatial Analysis, Disease Distribution

<http://geography.sdsu.edu/People/Faculty/getis.html>

David McArthur, Ph.D., Louisiana State (1969)
Physical Geography, Coastal and Fluvial Geomorphology, Quantitative Methods

<http://geography.sdsu.edu/People/Faculty/mcarthur.html>

Bob O'Brien, Ph.D., Washington (1965)
Conservation, Outdoor Recreation

<http://geography.sdsu.edu/People/Faculty/obrien.html>

Philip Pryde, Ph.D., University of Washington (1969)
Policy and management issues regarding protected natural areas, Environmental issues in the Former Soviet Republics

<http://geography.sdsu.edu/People/Faculty/pryde.html>

Frederick P. Stutz, Ph.D., Michigan State
Economic, Urban Transportation, Europe, GIS, Geographic Education

<http://geography.sdsu.edu/People/Faculty/stutz.html>

Richard D. Wright, Ph.D., University of Kansas (1967)
GIS, U.S.-Mexico Border Geospatial Data Integration, Map Interpretation and Analysis

<http://geography.sdsu.edu/People/Faculty/wright.html>

Janet Franklin, Ph.D., University of California, Santa Barbara (1988)
Department of Biology, SDSU

<http://www.bio.sdsu.edu/faculty/franklin.html>

James Chagala, Ph.D., UC Riverside (1994)
Urban, Planning

Alan Osborn, Ph.D, Univ. Oregon (1997)
Medical

Diana Richardson, M.A., SDSU (1987)
Environmental Resources and Planning, United States
Undergraduate Advisor
<http://geography.sdsu.edu/People/Faculty/richardson.html>

Jane Thorngren, PhD, UCLA (1988)
Biogeography, Environmental Studies, Physical Geography
<http://geography.sdsu.edu/People/Faculty/thorngren.html>

Fred Wildes, PhD, UC-Santa Barbara/SDSU (1998)
Human, Middle America, South America
<http://geography.sdsu.edu/People/Faculty/wildes.html>

Elizabeth Witztum, M.A., SDSU (2002)
Physical Geography, Remote Sensing

資料 1-3 ブリティッシュ・コロンビア大学（岩田 央）

資料 1-4 NY 州立大学バッファロー校（江崎亮介）

資料 1-5 UC サンタバーバラ校 (山崎裕太郎)

資料 1-6 メーン大学（倉田陽平）