

1-2014

GPHY 489.01: Cartography / GIS Laboratory

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Recommended Citation

von Reichert, Christiane, "GPHY 489.01: Cartography / GIS Laboratory" (2014). *Syllabi*. 1411.
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The University of Montana
Department of Geography
Spring 2014

GPHY 486:01 Transport, Planning and GIS - 3 credit (CRN 34110)
with co-requisite laboratory GPHY 489:01– 1 credit (CRN 33134)
Christiane von Reichert

Place:	GRT Lab, Stone Hall 217/ 218	Office:	Stone Hall 210
Time:	TuThu 8.10-9.30 am (class) We 8.10-10 am (lab)	Office Hours:	Tu 9.30-11, We 10.10-11, Th 9.30-11 and by arrangement
e-mail:	Chris.vonReichert@mso.umt.edu or c.vonreichert@umontana.edu	Phone:	406-243-4784
TA:	Alma Pacheco	TA Office:	Stone Hall 304B
TA e-mail:	alma.pacheco@umconnect.umt.edu or alma.pacheco@umontana.edu	TA Hours:	Th 10-12, Fr 1-3

Co-requisite: GPHY 489:01 Cartography/GIS laboratory 1 cr, W 8-10 (Geospatial Research and Teaching) Lab, Stone Hall 218.

The lab will provide you with hands-on experiences and opportunities to start on assignments. However, you should be prepared to spend additional time outside of lab periods to complete lab assignments, and to additionally explore transport-related problems or GIS-T features on your own. You should especially allow extra time for a small network project and the final course project. Please note that some class periods will be used for lab activities.

Pre-requisites and target audience: This course is designed for upper-division and graduate students. You should have an adequate quantitative background (M 115/Math 117 or higher) or you should be inclined to acquire it outside this course. Basic knowledge of Windows operations is assumed. GPHY 284 Introduction to GIS and Cartography or GEOG 381/GEOG 387 Principles of Digital Cartography is helpful, but not required. I am asking students with strong quantitative and cartography/GIS backgrounds to cooperate with others to promote success for all in this course.

Readings (overview): There is no textbook to purchase for this class. I selected the readings for this course from a variety of sources: chapters from text books, TransCad software manuals, and government reports including web publications. One copy of the TransCad Manuals is in the GRT Lab. Feel free to use it while working on your assignments in the labs. Please do not remove it from the lab, as this would deny your fellow students access to the materials. TransCad manuals consist of the User's Guide (UG), Travel Demand Modeling (TDM) manual, and the Routing and Logistics (R&L) manual. Specific book chapters and articles listed on the syllabus (please see schedule) will be placed on *Moodle*.

Learning outcomes:

Students in this course will

1. advance their insight into the **patterns and trends in urban passenger transportation,**

2. develop an understanding of the **principles of transport planning and travel demand modeling in GIS-T**,
3. gain the ability to **employ TransCad**, the leading GIS-T software, to **solve transportation and network problems, and run travel demand models**,
4. will become aware of TransCad capabilities for **routing and logistics**, including access to services, and locating service facilities,
5. and get to know street, socio-demographic and model-derived **data for Missoula, which will be used (and added to) throughout the course**.

Students will additionally

6. improve their skills in **organizing files and managing databases**,
7. and further their experience in **synthesizing** the findings of their model and **presenting** the findings **visually, in speech and in writing**.

Assessment: Progress in this course will be promoted in a variety of ways, and assessed and graded as follows:

- 1) Attendance and participating in class and lab, including in-class exercises (approximately 15 points).
- 2) Completion of a series of assignments (approximately 80 to 90 points)
Early, basic lab assignments will introduce you to essential TransCad functions. Several assignments will introduce you to the routing and logistics features of TransCad, useful for determining service areas. Most assignments of the course form a sequence for building the 4-step travel demand model using Missoula data. Please note that these assignments 'build on each other': to move forward, you must have completed the previous assignment. In essence, the assignments are cumulative. Additionally, they can form a considerable part ('standard model') of your final project. I strongly encourage you to keep up with the work and avoid falling behind. To show your progress, you will submit selected output and/or short write-ups.
- 3) Completion of a minor network project and a major final project (approximately 10 and 30 points)
For the minor network problem you will draw on knowledge gained from previous labs and solve a network problem of your choice (i.e. disabling links, change direction of speeds of links, turn penalties, etc.) (PowerPoint presentation and short, 2- to 4-page paper)
The final project will consist of a digital poster, a short presentation, and a concise (4- to 6-page) paper (please also note due drafts). The intent of the final project is to employ the widely-used four-step transport model for Missoula and modify it above and beyond the lab assignments. Examples of modifications: changes to the underlying transport network or to the land use system, changes in methods and parameter, or other modifications, such as pollution effects, bike routes, etc.
- 4) There also may be quizzes, which focus on your understanding of concepts used in the course. Quizzes will be announced at least one period in advance.

Graduate Increment/s:

1. Graduate students will additionally give a 10 minute presentation and write a 6- to 10-page paper which must contain: a properly formatted cover page, a table of content (Tip: use the ToC feature of your word processor), 1.5-2 line spaced text, a short bibliography/list of sources (Tip: use a bibliographic database manager such as the free on-line RefWorks or EndNote.) There are two options for that: a literature review option and an applied methodology option.
 - 1.1. For the literature review option, students will screen the professional **literature** for theoretical discussions and empirical findings on mode split (or another topic related to the course and of interest to you), or review an agency report or sections of a text.
 - 1.2. Alternatively, the graduate increment can be have a **methodological** and applied focus by exploring a TransCad feature not dealt with (or only briefly discussed) in class.
2. The final project of graduate students is expected to be more challenging and employ more sophisticated procedures than the projects of undergraduate students.
3. Graduate students are expected to participate in the Graduate Student and Faculty Research Conference in (most likely in April.)

Given the complexity of the grading system, it would create a considerable burden to keep track of late lab assignments. Please submit lab assignments on the due date. **You can miss one lab assignment without a negative effect on your grade. However, no late assignments.** Should we encounter an unforeseen and systematic technical problem that makes it difficult for the entire class to meet a deadline, a specific due date will be changed for all. Please communicate with me immediately if such technical difficulties should occur.

To be Determined: Assignment submission via Moodle or as hardcopy (decision pending).

Grades will be assigned using a +/- system as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
93.3-100	90-93.3	86.7-90	83.3-86.7	80-83.3	76.7-80	73.3-76.7	70-73.3	66.7-70	63.3-67.7	60-63.3	<60

Schedule: At the end of this syllabus is a schedule of topics, including a list of readings and due dates. Please refer to it to help you in organizing your work for this class. Hands-on labs are usually on Wednesdays, but periodically lecture periods will be used for labs to maintain a logical sequence. Labs are usually due 6 days after being distributed/made available. I have invited several guest speakers from the non-profit, the public, and the private sectors. These guest talks are not yet confirmed and shown as tentative. There are also some labs shown to be tentative, depending on the flow of the course. (However, we need to reach the Traffic Assignment stage as the final step of the Travel Demand Model.) Changes to the schedule may be made, and these changes will be announced in class.

Degree Requirements: GPHY 486 *Transport, Planning, and GIS* relates to Geography degree requirements as follows
for undergraduate students:

- BA/BS students pursuing a geography degree without option (BA/BS General Geography) can take this course as an elective.
- BA students in the planning option (BA CEP) select GPHY 468 *Community and Regional Analysis* **OR** GPHY 486 *Transport, Planning, and GIS* (they can also take both)
- Students pursuing the GIS certificate, can use GPHY 486/489 (Vector GIS & Networks) or/and GPHY 468/469 (Data Management & Collection) to meet the 7-9 elective credit requirement.

for graduate students:

- MA/MS students without option (General Geography): GPHY 486/489 is an elective
- MS student in the planning option (MS CEP) are required to take GPHY 468/469 Community Analysis (GPHY 486/489 is elective)
- MS students in Cart/GIS option (MS Cart/GIS) either take GPHY 486/489 Transport Planning **OR** GPHY 468/469 (other may be elective)
- Graduate students who write a thesis involving transportation methods (or network models) can, with the approval of their advisor, take GPHY 486 to meet the methods requirement of the graduate degree. Please note that, in addition to travel demand modeling, GIS-T can be used in the social sciences to solve routing and logistics problems. GIS-T can be used in the natural sciences as well, i.e. for watershed models.

Software, Team Work, Planning, etc.: This is a hands-on, project-oriented course which benefits from team work. We will have access to 25 server licenses. It is advisable to access the server licenses in sequence, not all at once. TransCad, a GIS-T (Transportation GIS) developed by the Caliper Corporation, is mainly designed for travel demand modeling as well as routing and logistics problems. The retail value is \$10,000 per single commercial license, and \$2000 per educational copy. TransCad can be accessed from 18 computers in the

GRT Lab 218, and 5 computers in 219. Several computers in SH 218 have the TransCad Demo installed, which will be used for some of the earlier labs. Please communicate with me about this meeting your needs.

During the first few class periods, we will use the TransCad Demo versions, installed on lab computers in 218 that do not have the academic TransCad version. The demo has the capabilities of the full TransCad version, however, it is limited to 30 (or 60?) minutes and only works with pre-defined files. You also cannot save your work and access it later.

Additionally, keep in mind that TransCad is challenging to novice users. The version currently in use (TransCad 6) includes an 'undo' feature, which was requested by previous users. However, 'undo' places greater demands on a computer system and this may challenge networked computers in lab settings.

(My experience: It really helps to close files after completing a step and re-opening for the next. If the software crashes, it helps to reboot the computer: shut it down completely and start new. It may be a good habit to do so before each lab session, especially once we start working with Missoula data.)

Course Materials and Communication via Moodle:

Course Materials: In my lectures, I will use PowerPoint presentations. I plan to post the presentations either shortly before class or soon after class on *Moodle*. This will give you access to course materials 24/7. I will also post this syllabus, and instructions for assignments/lab handouts on *Moodle*. I encourage you to regularly use *Moodle* as a resource for this course.

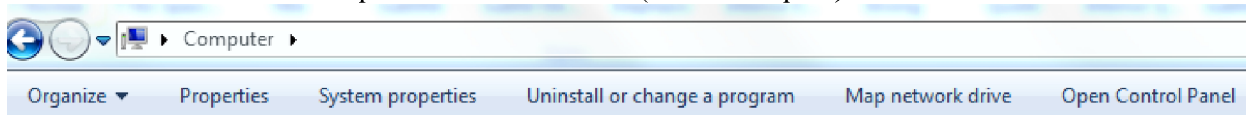
Please let me know if you prefer lab instructions as hard copies or if you prefer digital copies.

Communication: Besides access to course materials and assignments, *Moodle* offers easy communication between instructor and students. I will post announcements for the class, and also send e-mail. *Moodle* is set up to send e-mail to your official university e-mail address. If you do not regularly read your university e-mail, you could miss out on information. To avoid that, I recommend that you develop the habit of using your university e-mail or to forward messages from your university e-mail to the account that you use. IT Central can help if needed.

Logistics: The Lab, the Server, File Locations, File Organization, Printing, etc.:

Access to the GRT Lab (218 and 219): To access the labs 218 and 219 outside of the class period, please use your Griz Card. Contact Nancy Ebel to activate your Griz Card as a swipe card to access 219. I will make every effort to keep the door between 218 and 219 open. Please help me with these efforts.

The Server PTOLEMY: We will use the server Ptolemy, i.e. to access the Missoula street network data (provided by the Missoula Planners.) Note that you must be logged onto the computer under the Missoula domain using your Net-ID. Based on your Net-ID, you can get access to the server by 'mapping' to the Ptolemy server. I recommend to map to network **drive T** (T for transport).



[\\ptolemy\classes\GPHY486](#)

Specify the drive letter for the connection and the folder that you want to connect to:

Drive:

Folder:

Example: \\server\share

At a later time, I will provide a separate handout on the location of data.

Printing: For printing, the lab uses GrizPrint, which allows you to pay for printing with UMoney from your GrizCard, with your price to cover the department's cost. The printer, located in 219 (turquoise lab), is networked to computers in both 218 and 219. Tip: Learn to work with the color/BW options (to use your Griz\$ wisely)

Please Be Considerate of Others: Cell phones are disruptive to instructors and fellow students. If you carry a cell phone, please turn it off during the class period.

It is equally disruptive to arrive late or walk into and out of the class room during the class period. Your cooperation is appreciated in keeping these disruptions to a minimum, unless there are health problems or other special circumstances.

During the lab periods you may set a cell phone to a quite signal setting, which alerts you to a call without disrupting others. If you wish, you may step out during the lab period to respond to the call. Do not answer calls in the lab, please.

On Food, Beverages, and Health Habits: No Food in lab 218 and near computers in 219. Please use the Geography lounge for snack breaks between classes. Beverages are only allowed in our computer labs if kept in closed containers. This is to protect the equipment and to keep both working and eating environments sanitary.

Let us also keep in mind that this is cold and flu season and that we are working in fairly close quarters. An outbreak of cold or flu would negatively impact this course. Please wash your hands thoroughly and frequently and use hand sanitizer. Thank you!

Additional Information:

All students must practice **academic honesty**. Academic misconduct is subject to an academic penalty by the course instructor and/or disciplinary sanction by the University.

All students need to be familiar with the **Student Conduct Code**. The Code is available for review online http://life.umt.edu/vpsa/student_conduct.php

Please see the back of the Spring 2014 Class Schedule or link to <http://www.umt.edu/registrar/calendar.aspx> and http://events.umt.edu/?calendar_id=27&upcoming=upcoming& for **important dates and deadlines**.

Add and Drop policies are also stated on the website of the Office for Student Success <http://www.umt.edu/uac/adddrop.php> “After registering and through the **first seven (7) instructional days of the semester**, students may use [Cyberbear](#) add courses or change sections and credits; through the **first fifteen (15) instructional days of the semester**, students may use [Cyberbear](#) to drop courses. Fees are reassessed on the sixteenth day of the term. Added courses and credits may result in additional fees. For courses dropped by the fifteenth instructional day, no fees are charged and courses are not recorded.” Please consult the Registrar's calendar or the Student Success Office page for additional information.

Students requesting disability accommodations are advised to contact the **DSS office** (406-243-2243), Lommasson Center 154. Please see <http://www.umt.edu/dss/> or the corresponding pages of the Catalog. I will gladly accommodate students with disabilities. However, I need to be notified of that early during the semester. It is not feasible to retro-actively accommodate students.

Please see the Catalog pages for University policies on **Incompletes**. My recommendation: make every effort to avoid an Incomplete!

The **Office of Career Services** assists students in achieving career objectives. Please see the Catalog and the Career Services website for the range of services www.umt.edu/career. Note, for instance, the Big Sky Career Fair in February <http://www.umt.edu/career/bscf/bigsky.htm> and other career and recruiting fairs <http://life.umt.edu/career/CareerFairs/bsef/default.php>

A professional internship can be a useful addition to your formal education. Internship experience also adds to your resume. Furthermore, an internship can allow you to connect with a potential long-term employer. For the UM's **Internship Services**, please consult the website <http://www.umt.edu/internships>. Internship opportunities, brought to the attention of current or ex-students or our faculty members, are also publicized via the Geography listserv. Previously, students had also good luck in locating and even opening up internship opportunities by directly contacting agencies and employers they would like to work for. Professional conduct is critical in assuring success with in arranging for and successfully completing internships.

The **Geography listserv** allows you to gain and share information about up-coming departmental events (from group advising to parties); internship, preceptorship, and job opportunities; and other relevant information (graduation deadlines, course announcements, meeting announcements, etc.) The instructions below are from our website http://cas.umt.edu/geography/facilities_resources/list_serv.cfm

To Join:

- 1) Send an e-mail to: GEOGRAPHY-subscribe-request@LISTS.UMT.EDU
This must be sent from the e-mail account that you wish to be on the Listserv
- 2) Leave the subject line blank
- 3) In the body of the e-mail type this:
subscribe your name Geography

You will receive an e-mail message confirming your subscription.

If you have any questions, please contact Nancy Forman-Ebel (e-mail nancy.forman-ebel@umontana.edu)

Please use the listserv judiciously. Keep in mind that the REPLY key will go to ALL listserv members, not only the person who sent a previous message.

Spring 2014 Schedule			Gphy 486 Transport, Planning, and GIS w. co-requisite Lab		Please note: there may be quizzes
Week	day	date	Topic	Readings	Due
1	Tu	28-Jan	Introduction to the course, GIS versus GIS-T, TransCad Interface (discussion of graduate increment)	Hanson, S. 1995. Ch 1 Getting There. Urban Transportation in Context; Barber in Hanson, Ch 4 Aggregate Characteristics of Urban Travel, pp. 81-99; Movendzadeh 2007 Moving Millions, Ch 7; Miller&Shaw. 2011. Ch 3. GIS-T Data Models; Ch 1. Data Modeling and Database Design	
	We	29-Jan	Introduction to GRTL Labs. Lab 1a TransCad Basics (maps, bands, join data, dataview, etc.)	TCUG Ch 1 Introduction; TC Demo	
	Th	30-Jan	Lab 1b More Basic Transcad (dataview, selection sets, networks, shortest paths, multiple path matrices, disabling links, etc)	TCUG Ch 10 Selection Sets, Ch 13&14 Networks, Ch 18 Matrices, Ch 22 Geographi Analysis Tools	
2	Tu	4-Feb	TransCad Features		Lab 1a due
	We	5-Feb	Lab 2 Access to schools		Lab 1b due
	Th	6-Feb	non-profit sector guest speaker: Jordan Hess, Director of ASUM Transport		
3	Tu	11-Feb	TransCad: Regionalization: Thiessen Polygon vs. Regional Partitioning; Bands vs Network Bands: Facility Location Modeling	TCUG Ch 13&14 Networks. TCR&L Ch 4 Partitioning&Clustering. TCR&L Ch 5 Facility Location Modeling	Lab 2 due
	We	12-Feb	Lab 3 Garden Lab		
	Th	13-Feb	Lab 4, individual network problem, TransCad tools revisited (1a&1b)		Network problem idea due (2-4 lines)
4	Tu	18-Feb	Lab 4, individual network problem		Lab 3 due
	We	19-Feb	Lab 4, individual network problem		
	Th	20-Feb	Presentation: short individual/team network problem	TCUG Ch 7 Linear Referencing -- Date TBD	Lab 4: paper and Power Point presentation
5	Tu	25-Feb	GIS-GIST Centroids, centroid connectors	TCUG Ch 14 Network Settings	
	We	26-Feb	Lab 5 Centroid connectors (Manhattan)		
	Th	27-Feb	privet sector guest speaker: Sean Wohltman, GOOGLE Geospatial Scientist		
6	Tu	4-Mar	Context of Urban Travel, (Census abbreviated)	Barber in Hanson, Ch 4 Aggregate Characteristics of Urban Travel, pp. 81-99; Black 2003 Ch 18 Societal Trends. Moavendzadeh 2007 Ch 4 Moving Millions. NCHRP 365 Introduction; Msla TDME Travel Demand Enhancement	Lab 5 due
	We	5-Mar	Lab 6 Msla Socio-demographic Data	Geographic Terms and Concepts 2010 (selections from) http://www.census.gov/geo/reference/pdfs/GTC_10.pdf	
	Th	6-Mar	TDM Intro, Trip production and attraction		
7	Tu	11-Mar	private sector guest speakers: Nick Harris and Keely Gaskill, Edulog	TCTDM 5.0. Ch 3 Trip Generation-Attraction; NCHRP Report 365: Ch 3: Trip Generation, pp. 20-35	Lab 6 due
	We	12-Mar	Lab 7 Trip production lab		
	Th	13-Mar	MUAC -- (documentary)		
8	Tu	18-Mar	Additional Employment Data, Trip Attractions, Special Nodes, ITE Trip Rates; Missoula Streets		Lab 7 due
	We	19-Mar	complete: Trip Attractions; Lab 8 Missoula Streets		
	Th	20-Mar	Tentative: Lab 8b Mode Split/Mode split lab	TCTDM Ch 7 Mode Split	
9	Tu	25-Mar	Balancing, Trip distribution, PA-OD, VoC	TCTDM Ch 6 Trip Distribution; NCHRP Report 365: Ch 4. Trip Distribution, pp. 36-47. NCHRP Report 365: Ch 8 Time-of-Day Characteristics, pp. 81- 92; Ch 7 Automobile Occupancy Characteristics, pp. 76-80; TCDM Ch 8 P-A to O-D and Time of Day Transformations	Lab 8 due
	We	26-Mar	Lab 9: Balancing, Trip distribution		
	Th	27-Mar	public sector guest speaker: Dave Gray, Missoula, Transport Planner III		
10	spring break	March 31-April 4	no classes		
11	Tu	8-Apr	public sector guest speakers: Ben Weiss, Msla Bike Ped Coordinator & Alex Stokman, Missoula in Motion		Lab 9 due
	We	9-Apr	AAG --arrangements TBD. Lab 11 PA-OD, VoC		
	Th	10-Apr			
12	Tu	15-Apr	Q&A		Lab 11 due
	We	16-Apr	Lab 12: TBD (catchup, cleanup)		
	Th	17-Apr	public transport guest speaker: Mike Tree, Mountain Line		
13	Tu	22-Apr	Traffic Assignment	NCHRP Report 365: Ch 9 Traffic Assignment Procedures, pp. 93-103; TCTDM Ch 9 Traffic Assignment	Lab 12 due
	We	23-Apr	Lab 13: Traffic Assignment		
	Th	24-Apr	Review of TDM, final project as modification of 'standard model		
14	Tu	29-Apr	Graduate increment presentation		Lab 13 due
	We	30-Apr	Tentative: TBD		final project idea due (2-3 lines)
	Th	1-May	private sector guest: Tom Brigham, HDR (tentative)		final project idea due (1/2 page)
15	Tu	6-May	work on final		poster draft of final project due
	We	7-May	work on final		
	Th	8-May	1st round of annotated poster presentations		
				Missoula Bike Ped count, May 3 and May 6, volunteers needed	for bonus credit
16	Final s Week	We 5-14	Final exam period: 8-10 or 10.10-12.10; 2nd round of annotated poster presentations		digital poster and digital paper due, plus 8.5X11 hardcopy poster and paper hardcopy
		17-May	Commencement		