ICA CET Activities: Development of the ICA-sponsored Internet Cartography Teaching Programme

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81 member countries (2006)

International Cartographic Association

Commission on Education and Training (CET)

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International Cartographic Association – 2003-2007

CET members - 2003-2007

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Sidebar navigation:
ICA ACI
- Terms of reference
- Calendar
- Commission members
- Mailing list
- Undergraduate Cartography courses
- Internet Cartography Teaching courses
- History of the Commission
- Seminars and workshops
- Publications
- Newsletters
- Proceedings
- Basic Cartography
- Reports
- CET photos
- Sister societies
- Startpage

webmaster

http://lazarus.elte.hu/cet

Terms of Reference ICA CET 2003-2007

- To work for the general aims conceived in the ICA Statutes.
- To produce an ICA-sponsored Internet cartography teaching programme (modules), with regional workshops for training the teachers.
- To produce an ICA-sponsored Internet programme for continuing education, with regional workshops for teacher training.
- To support cartography and cartographic education in developing nations by holding seminars in developing nations.
- To promote integration by establishing linkage with the committees on education of sister surveying and mapping disciplines, by producing a list of institutions providing cartography course programmes, and interact as much as possible with other ICA commissions and working groups (organize joint meetings).
- To produce appropriate publications for dissemination of results of the above efforts and publish it in proceedings or on the CET website according to the IOF publication policy.

ICA CET Activities: Development of the ICA-sponsored Internet Cartography Teaching Programme

- The proposed ICA sponsored Internet cartography teaching programme has been under development for a number of years as one of the activities of the CET.
- The teaching programme aims to provide modules on cartography for delivery over the Internet so that students from any geographical region have access to Bachelor of Science level cartographic theory and practice.
- The approach is to present a 'holistic' staged approach to education, with each stage becoming more sophisticated and closer to what is expected for a BSc program.

The level of courses

Factors of decision making:

- the aim of cartographic courses is different in different countries and universities;
- in some countries there are no independent courses for cartography at university or high school level (for smaller countries the alternatives are less specialized);
- some of the courses are too specialized for some cartographers (focus on GIS, geodesy, map history, map publishing, infographics);
- naturally, the computer based cartographic courses can be the skeleton of the whole project, but the courses must be as software independent as possible.

Potential benefits for ICA and for the countries

- in some countries this project can be the only opportunity for teaching;
- it can be used as a supplement to existing courses;
- it can contribute to upgrading similar existing courses;
- it may provide a standard for comparison with existing courses.

The need for the web course on cartography

- Numbers of students and trainees in cartography proper are relatively small.
- It is only in the larger countries that independent cartography programmes can exist.
- For smaller countries the alternatives are less specialised and less frequent education and training.
- No separate WWW cartography courses exist.

Characteristics of the course

- Independent.
- Full-fledged cartography web course.
- To set a standard in cartography teaching.

These initial seed ideas helped to form the foundation for the existing program and provided the guidance from which the following objectives were developed.

Requirements of the courses

- participants must have access to the web several hours per week,
- colour printing facilities,
- a scanner (preferred),
- access to a graphics department or cartography section,
- a library - to provide some basic literature,
- literature referred to in the course should be accessible through the web as well.

Internet Cartography Teaching courses
coordinator: David Fraser, vice-chairman

The planned curriculum:

	BACHELOR OF SCIENCE IN CARTOGRAPHY					
Code	Title	Duration	Start semester	Web contact required per week	Non-contact or student guided hours	Points allocated to the unit (if applicable)
First year						
ICA100	Maps and Cartography	2	1	4	2	12
ICA101	Nature of Cartographic Representation	1	1	2	1	6
ICA102	Topographic Mapping I	2	1	4	2	12
ICA103	Digital Mapping I	2	1	4	2	12
ICA104	Map Projections I	1	2	2	1	6
ICA105	Generalisation I	1	2	2	1	6
ICA106	Introduction to GIS	1	2	2	1	6
ICA107	Data Capture	1	1	2	1	6
						66
Second year						
ICA200	Map Projections II	1	1	2	1	6
ICA201	Generalisation II	1	2	2	1	6
ICA202	Topographic Mapping II	1	2	2	1	6
ICA203	Colour Use	1	1	2	1	6
ICA204	Reproduction Processes	2	1	4	2	12
ICA205	Databases	2	1	4	2	12
ICA206	Legal Aspects and Copyright	2	1	4	2	12
ICA207	Thematic Mapping (methods)	1	2	2	1	**6**
						66
Third year						
ICA300	Statistical Map Design	1	1	2	1	6
ICA301	Map Use	1	2	2	1	6
ICA302	Atlases	1	2	2	1	6
ICA303	Toponymy	2	1	4	2	12
ICA304	Generalisation III	1	1	2	1	6
ICA305	Internet Mapping	2	1	4	2	12
ICA306	Cartography and GIS	2	1	4	2	12
ICA307	Mapping Project	2	1	4	2	12
						72

Revised list of topics, curriculum (2003-)

Maps and Cartography
Nature of Cartographic Representation
Topographic Mapping I
Digital Mapping I
Map Projections I
Generalisation I
Introduction to GIS
Data Capture

Map Projections II
Generalisation II
Topographic Mapping II
Colour Use
Reproduction Processes
Databases
Legal Aspects and Copyright
Thematic Mapping (methods)

Statistical Map Design
Map Use
Atlases
Toponymy
Generalisation III
Internet Mapping
Cartography and GIS
Mapping Project

Undergraduate cartography courses

partly based on the results of the European Education in Geodetic Engineering, Cartography and Surveying (EEGECS), Socrates Thematic Network

ASIA - AFRICA - CENTRAL&SOUTH AMERICA - NORTH AMERICA - AUSTRALIA

Last updated: 2 April 2006

coordinator: David Fraser, vice-chairman

Country	Institution	Faculty (Department)	Programme (curriculum)	Degree	Specializations	Duration (semesters)	Courses on other languages
EUROPE							
Austria	Technical University **Graz**	Civil Engineering	Geomatics	Bach.techn. & Dipl.-Ing.	No	6(B.Sc.) +4(M.Sc.)	M.Sc. (eventually)
	Vienna University of Technology	Mathematik und Geoinformation	Surveying and Geoinformation	Dipl.-Ing.	No	9	no
	University of **Vienna**	Earth Sciences, Geography and Astronomy	Geography, Cartography	Mag.	Yes (Cartography and Geoinformation)	9	M.Sc. (planned; in English)
Belgium	University of **Liege**	Sciences	Geomatics & Surveying	BSc and MSc, Candidat, Licence	Bachelor in geographical sciences, general orientation, Master in geographical sciences, geomatics and geometrology orientation, specialised approach, "candidat" in geographical sciences (geomatics et geometrology option), "licencié" in geographical sciences (geomatics and geometrology option)	6(BSc), 4(MSc), 2(candidat), 4(licence)	no
	University of Applied Sciences KaHo **Sint-Lieven**	Industrial Sciences	Industrial Engineering	Master in industrial sciences in Surveying	No	8	no
	Universiteit Gent	Faculty of Sciences	Geograpy and Geomatics	BSc and MSc	No	6(BSc) +2(MSc)	no
	Vrije Universiteit Brussel	Faculty of Science	Cartography and GIS	BSc	Yes (Geowetenschappen, Stadsstudies of Geo-informatiekunde)	6	no
Bulgaria	University of Architecture, Civil Engineering and Geodesy	Geodesy	Geodesy	MSc	Yes (Geodesy, Applied Geodesy, Photogrammetry and Cartography, Land management)	10	no
Croatia	University of **Zagreb**	Faculty of Geodesy	Institute of Engineering Geodesy and Spatial Information Management			9	
Czech Rep.	**Brno** University of Technology	Civil Engineering	Geodesy and Cartography	Geodesy and Cartography	Yes (Engineering Surveying, Cadastre of Real Estate)	8	no
	Charles University, **Prague**	Faculty of Science	Dept. of Cartography and Geoinformatics	(BSc and MSc)	No	6(BSc) +5(MSc)	no
	Czech Technical University, **Prague**	Faculty of Civil Engineering	Mapping and Cartography				
Denmark	**Aalborg** University	Faculty of Engineering and	Surveying	(BSc and MSc)	Land Management, Spatial Information Management(GIS		

The way forward – the realization

1. It is not possible for members of the CET to produce, or even gather, all the modules of a high quality as an on-line BSc Cartography program.
2. It would require a massive effort over an extended period for the CET members to attend to all the tasks required to maintain such a program.
3. Existing providers of on-line programs in cartography were concerned that the ICA program would compete with their offerings.
4. An opportunity presented itself at the conference for the ICA to access existing modules without cost.
5. It was suggested that the ICA could provide accreditation of suitable on-line providers (universities).
6. Accredited providers would earn the right to use the ICA accreditation in their marketing material.
7. A representative from each accredited provider would sit on a panel to determine the way forward for the ICA involvement in on-line learning.
8. The ICA CET initiative would target locations where no reasonable opportunity existed for individuals to be trained and educated in cartography.
9. The ICA CET should provide a doorway to on-line cartographic training and education
10. The ICA CET should, in the early stages, provide mentors for individuals enrolled in the program.

The way forward – plan for the realization

The ICA CET will set up a global management structure and will facilitate access to basic and intermediate training in cartography using a selection of on-line modules.

The ICA will accredit suitable on-line providers (universities).

When a student has completed and satisfied the assessment requirements for the basic and intermediate training in cartography using the on-line modules they will be eligible to apply to take up the on-line offerings available through the accredited providers registered with the ICA.

A student may be guided to one particular program offered at a single university or may select modules from a number of on-line providers which will sum to the equivalent of a BSc - Cartography.

Area of CET responsibilities

- Coordinate and facilitate on-line learning activities for developing countries
- Arrange formal agreements with universities providing on-line materials
- Establish a structure for the management of on-line learning to BSc level
- Provide formal endorsement and accreditation of quality courses

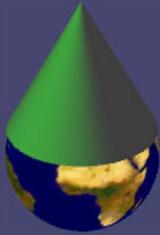# Administrative Sequence of Activities

A high level of commitment is required by one, or a group of individuals, before significant progress can be made with the program.

There are many steps in the process and it is likely that the momentum will change as those involved pass on the task to other CET members.

Samples

Conic projections

In the conic projection the graticule is projected onto a cone tangent, or secant, to the globe along any small circle (usually a mid-latitude parallel). In the normal aspect (which is oblique for conic projections), parallels are projected as concentric arcs of circles, and meridians are projected as straight lines radiating at uniform angular intervals from the apex of the flattened cone. Conic projections are not widely used in small scale mapping because of their relatively small zone of reasonable accuracy. The secant case, which produces two standard parallels, is more frequently used with conics. Even then, the scale of the map rapidly becomes distorted as distance from the correctly represented standard parallel increases. Because of this problem, conic projections are best suited for maps of mid-latitude regions, especially those elongated in an east- west direction.

If you have a VRML-compatible browser installed on your computer, you may want to look at the following 3D virtual model of a cone, halfway between a globe and a conic projection. If you do not have a plugin capable of rendering Virtual Reality Models, you can download e.g. the Cosmo player or the Viscape player.

General characteristics

- Lines of latitude and longitude are intersecting at 90 degrees
- Meridians are straight lines
- Parallels are concentric circular arcs
- Scale along the standard parallel(s) is true
- Can have the properites of equidistance, conformality or equal area
- The pole is represented as an arc or a point

Ptolemy (in A.D.150) made no reference to a cone, but introduced two projections with concentric, circular arcs for parallels of latitude (like conics) but with meridians that are broken straight lines or circular arcs. These projections although conic-like, were not conic.

Equidistant or simple conic projection

- Equally spaced parallels
- Compromise. Direction, area, and shape are distorted away from standard parallels
- Equidistant meridians converging at a common point
- This projection was developed by De l'Isle. It was used for field sheets and some charts of small areas in th 19th century.

Samples

The following preliminary courses were developed:

- **Map projections** (Antal Guszlev, Hungary)
- **Graphic file formats and conversion** (László Zentai, Hungary)
- **Methods of cartographic representation** (Anton Ryazanov and Vladimir Tikunov, Russia)
- **Toponymy** (Ferjan Ormeling, The Netherlands)

Sample design (Barend Köbben, The Netherlands)

Samples

File formats on the Internet

In the very beginning of the web only two image formats were supported: JPG, GIF. Both of them uses lossy compression, the smaller the file size, the worse the image quality.

Raster formats:

- Formats supported by web browsers:
  - JPG (good for photos),
  - GIF (good for images using large homogenous areas, like maps),
  - PNG (portable network graphic).
- Formats require plug-ins:
  - wavelet formats (e.g. MrSID - Multi-resolution Seamless Image Database, suitable for very large images: airphotos, old maps - special compression methods).

Vector formats:
(the main advantage is the possibility of zoom in and out)

- Formats supported by web browsers:
  - there are different needs, but no simple solution (each important vector format has its own plug-in).
- Formats require plug-ins:
  - SWF (Macromedia Flash),
  - SVG (Adobe Scalable Vector Graphics),
  - VML (Microsoft Vector Markup Language, built-up in Internet Explorer, but nobody uses it),
  - WebCGM (sometimes used in GIS environment),
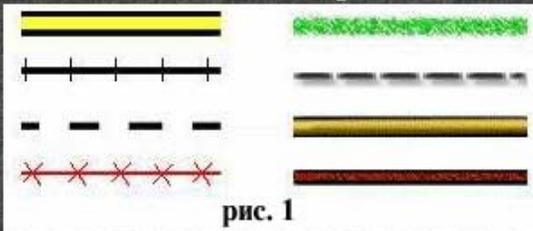 - other solutions for industry standard GIS packages (Mapinfo, ArcView, AutoDesk).

Samples

Method of Linear Symbols.

<u>Line symbols</u> are used to represent the events that are localized on lines (for example, lines of watershed, lines of tectonic breaks) and the demarcating lines (borders of regions, states) and in order to mark objects that have linear character, that are not manifested by its width in a scale such as rivers, roads, shore lines.

The main means for reproduction of object's qualitative and quantative characteristics. (p.1) are color, picture and the width

рис. 1

of the symbol. On the topographical maps with the considerable width of the line symbol it is placed in such a way that the axis coincides with the true location of the object. On the thematic maps another technic is used as well, when colored or hatched stripe of the symbol is placed at the side, along the line that marks the true location of the object. Change of the object's location at the place is represented with the help of combining of the line symbol. <u>For example, change of the state border by the time is represented by the series of lines differed by structure and color.</u> The same change at electronic maps can be represented with the help of animation. Replacing of river lines by each other will help to trace the change of river-beds` location through different geological epochs. Pulsatory lines of the rivers can show the degree of their usage for shipping, and different shades – the season of navigation. According to programme or manipulation provided by the user it is possible to define the type of rivers' nutrition, time of the flood and freezing by the pulsatory lines of the rivers. Historical development of the road network can be traced by using growing lines of roads or lines that grow in width for demonstration of traffic flow growth. Pulsatory roads can show not only sections of arterial roads that are under construction, but also the most overladen streets in the rush-hours, and possible routes of its detour, for example at the map of Moscow. Besides, the changing width of road lines can show dynamic of traffic change thought the day. Change of the shoreline position allows to learn the dynamics of rises and falls of the earth's crust at its single sections and in different geological epochs.

[Back] [Contents] [Next]

ICA course on Toponymy – HOME PAGE

HOME

PROGRAM

SELF STUDY

EXERCISES

DOCUMENTS

LINKS

CONTACT

WELCOME TO THE ONLINE TOPONYMY COURSE!

This course has been prepared by prof. Ferjan Ormeling and produced in the framework of the International Cartographic Association's web course development. Web compilation and adoption was done by Antal Guszlev.

Course objectives:

- Provide basic knowledge to deal with geographical names
- BSc level

Course structure:

- National framework: Follow names 'production' process:
- collection, processing, standardizing, visualization
- International framework: different languages, scripts, conversion
- Institutional aspects: United Nations Group of Experts on Geographical Names (UNGEGN)
- Products: gazetteers

To whom is this course intended for?

- Topographers that collect geographical names
- Staff of geographical names branches
- Cartographers that have to select names for their maps
- Map and atlas editors

FREQUENTLY ASKED QUESTIONS

Experiences of the sample modules

- Always remember the final goal, the **B.Sc. level – I** assume every expert of a certain topic is keen on adding more information about the subject;
- design the course as something between eLearning and a normal university course;
- it is very good if the author of the module is familiar with the available presentation methods and techniques of the web environment;
- always test the course with the potential users, ask for feedback (use a questionnaire if necessary or simply discuss the experiences personally);
- give hints for students who are interested in specific fields (literature or web links can be enough in most cases);
- use graphics as many times as it is necessary.

Experiences of the sample modules (cont.)

- Always take into consideration the technical potentials in less developed countries: the Internet connection can be very slow, so the on-line version has to work in off-line environment, too;
- we do not suggest using the newest web techniques, because the computers in less developed countries can be out-of-date, and these computers are not able to use the newest versions of the web browsers;
- using vector based web techniques (Flash or other file formats, like SVG) should be carefully tested or it is probably better not to use these kind of features, because they are not supported by the browsers directly (plug-in is required);
- if we let the whole course material download for off-line use, we should use simple techniques, which perfectly work even in off-line environment;
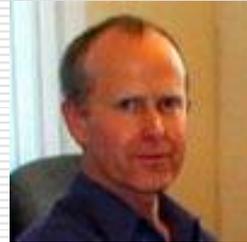- the basic units of the module (separate HTML files) should be short.

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