A Model Curriculum for Medical Physics Education

A project of the International Organisation for Medical Physics

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Overall Statistics of ETC activities in the period 1994-2006 *:

Directly carried 47 activities in total (approx. 4 per year);

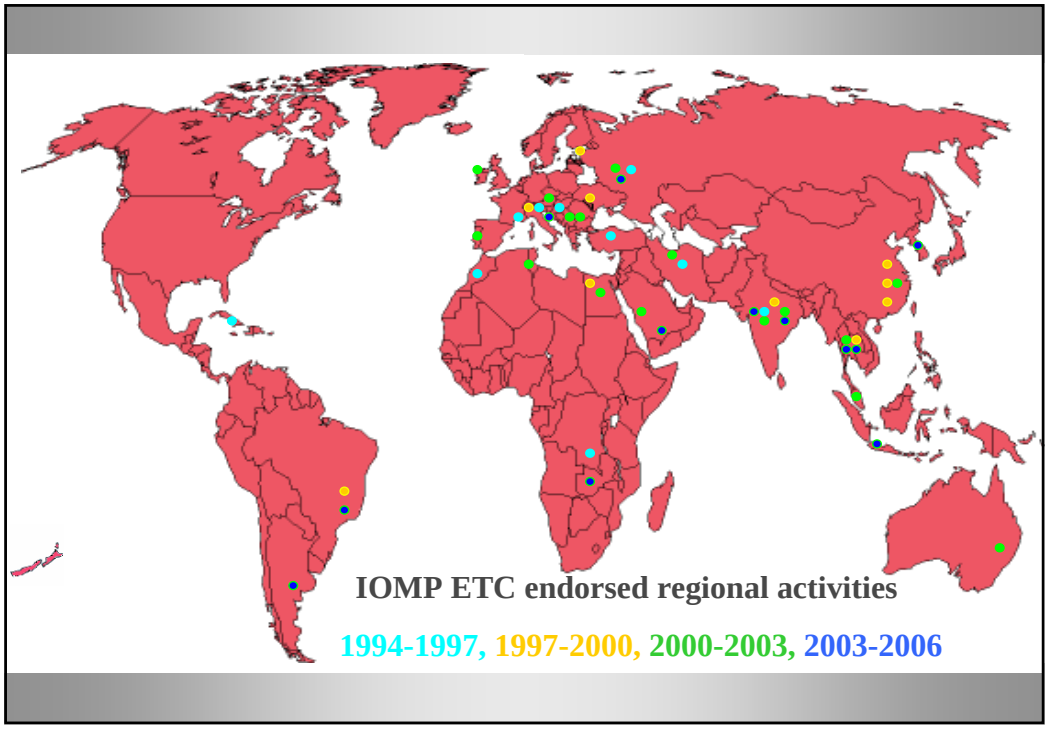
Trained approx. 3600 colleagues;

Faculty members – approx. 270

During every period colleagues from approx. 30-50 countries have been involved;

Overall financial support from IOMP for the period – c. 38,000 USD

* N.B. This statistics does not include other indirectly-related activities supported by International projects, national member societies and chapters, as well as the special IAEA training courses.



IOMP Increased collaboration with other Organisations (selected):

- IAEA (Radiological Protection of Patients activities);
- IUPAP (Physics and Sustainable Development);
- WHO, PAHO, ICTP (International Medical Physics College)

Latest developments (2005-06):

IAEA International Action Plan of the Protection of Patients: *"… recognizes the current shortage of adequately trained personnel in most developed countries and some developed countries…There should be development of a consensus on manpower needs in the next 10-15 years…"*

IUPAP World Conference on Physics and Sustainable Development*: Main areas Physics for Energy and Environment; Physics and Economic Development;* ***Physics and Health****; Physics Education.*

LEARNING PROCESS

1. EDUCATION : UNIVERSITY (academic)

- first 3 (or 4) years - BSc level (undergraduate or graduate)

- next 1 (or 2 years) - MSc level (graduate or postgraduate)

* student - lecturer - diploma (grade) - can not work unsupervised

2. TRAINING: HOSPITAL (post-MSc, practical)

- junior level (specialize 6 to 24 months)

- senior level (varies, after X years experience)

* trainee (stagier) - supervisor (trainer) - professional recognition

3. CPD (experience on the working place, courses)

* lifelong learning - professional career

EDUCATIONAL PROGRAMMES (CURRICULA)

- **Developed mainly at National (University) level**
- **International collaboration with good results**
- **International Medical Physics College at ICTP, Trieste**
- **IOMP Global Directory of Graduate Education Programs**

TRAINING PROGRAMMES (PRACTICAL COURSES)

- **Developed mainly at National (Society) level**
- **International collaboration (eg. Emerald) with good results**
- **IAEA - very active with extensive national and regional projects**
- **IOMP support for various Courses and Workshops in collaboration with Regional Chapters and Associations (ex. AAPM)**

CONTINUING PROFESSIONAL DEVELOPMENT

- **Developed at various levels (ex. Summer Schools)**
- **IOMP supports Short Courses and Seminars (with national societies)**

NECESSITIES FOR MEDICAL PHYSICS TRAINING:

1. Training scheme (program) for various specialities
2. Accredited (recognised) University background (MSc course)
3. List of competencies (necessary skills to require after training)
4. Accredited Training Centres (Medical Physics Departments)
5. Hospital facilities (available equipment and time for training)
6. Time for the supervisors (trainers) to guide the trainees
7. Training includes educational environment (libraries, etc.)
8. Examining professional body (society)
9. Professional recognition after the training

The first step – MSc Programme development:

Common obstacles:

- Teaching faculty and resources
- Lack of International Model for the MSc Curricula
- Difficult accreditation at national level

World Conference on Physics and Sustainable Development
PHYSICS & HEALTH

IOMP Project aims:

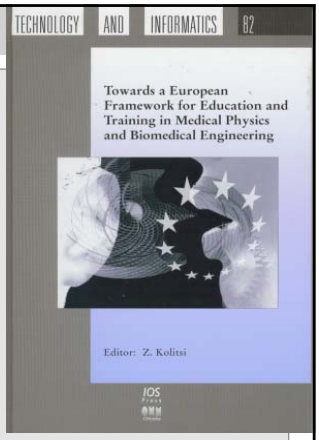
- To provide support for development of the MSc Curricula
- To support the accreditation through validation the MSc programme

Background

- Guidance from UK: IPEM and USA: AAPM and other professional bodies (from ~1980)
- Book with Education and Training Programs (30 European countries) - 1994
- EU Educational projects TEMPUS (including 8 countries 1995-2001)
- Education sessions at the ICTP International Medical Physics College (2002, 2004, 2006)

www.emerald2.net

TEMPERE EU Project Book (2001)



PART I: EDUCATION AND TRAINING IN MEDICAL PHYSICS AND BIOMEDICAL ENGINEERING

1. Introduction
2. Medical Physics as a Career
3. Biomedical Engineering as a Career
4. Education and Training in Med. Phys. & Eng.

PART II: THE TEMPERE RECOMMENDATIONS

1. Introduction
2. The TEMERE Quality Assurance Framework
3. Competencies in Medical Physics and Biomedical Engineering
4. Education in Medical Physics and Biomedical Engineering
5. Training in Medical Physics and Biomedical Engineering
6. Accreditation and Licensing
7. Application of the TEMPERE Recommendations
8. Mapping on TEMPERE
9. The way forward

PROJECT OUTLINE

Entry requirements : undergraduate degree based on min. 3 years University education in Physics, Engineering or relevant.

Medical Physics course - Post-graduate programme (MSc) approx. 1 to 2 years

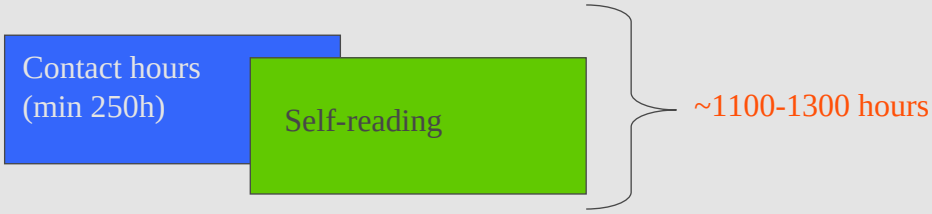
- Educational structure and teaching delivery
- MSc model curriculum and assessment
- Teaching materials (including IOMP supported Web resources)
- International pool of experts (faculty)
- MSc programme IOMP Validation
- ETC new sub-committee (Validation and Accreditation Panel)

Structure of the MSc programme

- Distributed delivery (classical)
  - Requires large faculty, problematic if lecturer is absent
  - Often preferred by students (easy to follow the material)
- Modular delivery
  - Suitable arrangement for the faculty (allows external lecturers)
  - Allows easier understanding of complex material
  - Problematic if student is absent
- Mixed delivery
  - local plus external lecturers
  - basis and optional courses (modules)

Draft MSc model curriculum structure

1. Taught element: overall contact and self-reading hours



2. Research element: MSc project and dissertation level/volume

~500-600 student hours

Overall ~ 1700-1900h

Taught element - draft MSc curriculum

Pre-course preparatory modules (Physics, Engineering)

Basis of Human **Physiology** and Anatomy	~10%
Basis of Radiation Physics	~10%
Research Methods	~10%
Radiation Protection and Hospital Safety	~10%
Medical Imaging physics and equipment 1 non-ionizing radiation (MRI, US)	~10%
Medical Imaging physics and equipment 2 ionizing radiation (DR, NM)	~10%
Radiotherapy Physics	~15%

Other optional modules (Management, IT, etc.)

MSc project **~25%**

M-level (MSc) project/thesis

- Suitable subject (a list of existing subjects and sample thesis from various Universities can help this issue);
- Form “Paper-like” (Introduction and Aim; Literature Survey; Material and Methods; Results and Discussion; Conclusion; References);
- Indicative volume ~10,000-15,000 words (50-70 pages), but the main guide should be the type and quality of research;
- Indicative time for development ~min 500-700 hours (max 6 months Full Time);
- Assessment – thesis marking model + oral examination

Future project development

-ETC Working Group (future Validation and Accreditation Panel):

S.Tabakov, A Krisanachinda, P Sprawls, E Podgorsak, C Lewis.

- Detailed Curriculum for a number of subjects (as a sample);
- Teaching materials assessment/selection;
- Creating a pool of experts (external faculty);
- Criteria for Course Validation;
- Funding allocation;
- Introduction by WC2009
- Discussion at various stages (alongside the EMITEL project);

ETC MILESTONES in the period:

1994-1997

- Global List of Graduate Programs in Medical Physics (continues)

1997-2000

- System for supporting (incl. financial) International programs

- Track of Education&Training programs at WC

2000-2003

- International Conferences/Workshops on Education&Training

- Intensive development of e-Learning (2004 Leonardo da Vinci Award)

2003-2006

- Project for MSc Model Curriculum

- Project with IOMP as a partner (EMITEL)

E-Encyclopaedic Medical Physics Dictionary EMITEL

(an EU project with IOMP, covering both EMERALD and EMIT)

Approx. 3500 terms in 14 languages languages