

# Jülich Nuclear Chemistry Summer School - JUNCS

F. Hoyler, U.W. Scherer

Basic Information and skills in Nuclear and Radiochemistry  
are needed in many disciplines

- **Nuclear Technology:** Front end and back end of fuel cycle, reactor operations
- **Radioecology:** Measure and model environmental radioactivity
- **Tracer Applications:** Industrial, Science, Medicine
- ...

There are few universities still supplying this education

## 2006 Workshop Valencia

Discussion and Expression of interest in organizing a CHERNE course on Nuclear and Radiochemistry

## 2007 Workshop Prague

- ◇ Proposal to apply for a ERASMUS Intensive Program grant
- ◇ Planned to organize a summer school in August 2007 jointly with ISIB, UniBo, UPV, and XIOS.
- ◇ IP Proposal submitted in Germany granted for 2008-2010

First Jülich Nuclear Chemistry Summer School in August

- ## 2008
- ◇ IP Proposal resubmitted for 2009 (decision pending)
  - ◇ JUNCS08 being organized for August 17-30, 2008

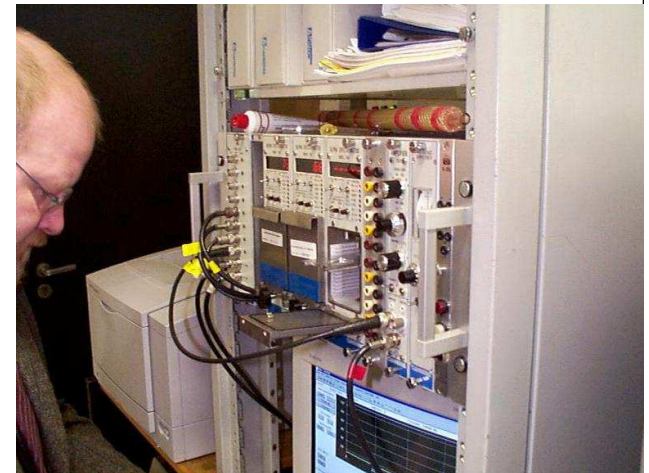
- Lectures and Seminars for theory/repetition supplied by lecturers of the participating institutions:  
A. Hardy, F. Hoyler, C. Licour, U.W. Scherer, S. Schreurs
- Laboratory tasks in small groups (2-3 students)



## Practical Measurement and Shielding of Radioactivity

(Repetition)

**Prerequisites:** Basic knowledge of radioactivity and nuclear radiation measurement



### Contents

- Radiation Safety
- Working with typical detector systems (GM-tubes, proportional counters, NaI(Tl), Si-, and HPGe-detectors)
- **Liquid Scintillation Counting** (Quench,  $\alpha/\beta$ -discrimination)
- Counting Statistics





## Stage 2: Nuclear and Radiochemistry

### Prerequisites :

- Basic experience in Chemistry lab work

### Contents:

- Radiation Safety : working with open sources
- Activity and Mass
- Production of Radionuclides
- Radiochemical Separation Techniques
- Radiolabelling Techniques
- Applications of Tracers
- Chemistry of Radioelements



## Stage 2: Nuclear and Radiochemistry (cont.)

- Working techniques in the radiochemical laboratory
- Neutron Activation Analysis
- Performing typical radiochemical techniques
- One experiment in XIOS



- After the experiments: data analysis and discussion of the results
- Excursions e.g. to Jülich Research Center
- Two evaluations of the students (Multiple Choice) at the end of each week.
- Students prepare a presentation of one experiment for the last day.
- Course evaluation:
  - ◇ Round Table :
  - ◇ Questionnaire
- 4 ECTS and grade based on evaluations and presentation





## General information (May, 2008)

- 15 participants
- Accomodation:
  - Guest house Juelich Research Center (~ 150€ / person/ week)
- Course fee < 200 € (course materials, consumables, tuition)
- Transportation through
  - airports Cologne, Düsseldorf, Maastricht
  - by train

# Preliminary Schedule 2008 Week 1

	Sun Aug 17	Mon Aug 18	Tu Aug 19	Wed Aug 20	Thu Aug 21	Fri Aug 22	Sat Aug 23
9:00 - 10:30		Welcome & Intro L 1:RadSafety	L3:Radiation Detection	L4:Liquid Scintillation Counting  UWS	E6: NAA FH	L6: Radiochemical Separations	
10:45- 12:15		L 2: Decontam. UWS	E 2:Radiation Detection 1	L5: Handling of Radiochemicals	E7: XRF	E8: Extraction and Deposition of Polonium	
12:15- 13:00		Lunch Break	Lunch Break	Lunch Break	Final Data Review	Lunch Break	
13:00- 16:00		E1: Decontam.	E3:Radiation Detection 2 & Counting Statistics	E4:LSC Quench  E5:Chemical Lab Techniques	Lunch Break  Excursion Research Center Jülich	Data Review  Learning Control	
16:00- 17:30		Data Review Preparation of Reports	Data Review Preparation of Reports	Data Review Preparation of Reports		Preparation of Reports	
19:00	Arrival				Course Evening 1		

# Preliminary Schedule 2008 Week 2

	Sun Aug 24	Mon Aug 25	Tue Aug 26	Wed Aug 27	Thu Aug 28	Fri Aug 29	Sat Aug 30
9:00-10:30		L6: Nuclide Production	L7: Radiolabeling	Experiment at XIOS Diepenbeek	L9: Tracer Applications	Reports of the Students	Departure
10:45-12:15		E9: Sepn. of Uranium Progeny	E13 Iodine Exchange Rxn.	E15: Radiometric Titration	E16: Activation Analysis and Solubility	Learning Control	
12:15-13:00		Lunch Break	Lunch Break	L8:	Lunch Break	Lunch Break	
13:00-16:00		E10 Radiolabeling & Quality Control	E14 Carrier-free <sup>56</sup> Mn	Radioanalytical Techniques An Hardy	Data Review	Course Evaluation	
16:00-17:30		Data Review Preparation of Reports	Data Review Preparation of Reports	Data Review Preparation of Reports	Guided Tour Jülich		
19:00					Course Dinner	Departure	

## Additional Activities





- Distribution of subjects (1 week radiation measurement, 1 week nuclear chemistry) was inappropriate.  
More radiochemical experiments desired: **Changed for 2008**
- Students ratings of all other items were good  
(between 1.7 and 2.3 on a scale 1 (very good) – 5 (insufficient))
- Except for housing where we had to use a cheap accomodation  
(because we had no EU funding) **Changed for 2008**
- Results of students evaluations: 50-85% correct answers

Overall concept is good, some minor improvements added:  
**Nothing is as good that it could not be improved further**

# Studying in Jülich



**Technology Center**



**Research Center**













**We are looking forward to host your students !**