



# International School on Foraminifera

## 16<sup>th</sup> Course

### Urbino

10<sup>th</sup>– 28<sup>th</sup> June, 2025

### First Circular

#### Course Description

The 16<sup>th</sup> Course on Foraminifera is designed to provide an overview of the Taxonomy, Ecology, Biodiversity, and Geological History of Benthic and Planktonic Foraminifera. This intensive course is intended for students interested in Micropalaeontology, Palaeoceanography, Palaeoecology, Climate History, Biology, and Environmental applications. The aim is to provide a primer on the study of foraminifera and examples of how foraminifera can be used as (paleo)environmental and (paleo)oceanographical proxies. We review the current classification schemes of the foraminifera, discuss their ecology and life history, review their usefulness for biostratigraphical applications, and use case studies to investigate the geological history of the group with lab and practical sessions. The entire course consists of approximately 60 hours of lectures and 60 hours of practical work.

#### Course Structure

Four distinct courses are planned: Foraminiferal Introduction (11-15 June), Larger Benthic Foraminiferal Course (16-19 June), Planktonic Foraminiferal Course (21-24 June) and Smaller Benthic Foraminiferal Course (25-28 June).

#### Teaching Format

The course consists of lectures and practical classes covering the taxonomy, distribution, ecology, and paleoecology of foraminifera. Microscope lab sessions provide the opportunity for participants to learn the foraminiferal genera and species and view Cretaceous to Neogene foraminiferal assemblages from Petroleum Exploration areas and ODP sites as well as Quaternary and modern assemblages. At the end of each lecture session, different tasks will be assigned to participants to reinforce the knowledge learned. Course materials include the pdf lectures and numerous pdf reprints of classic papers.

#### Courses Outline

*10 June* Icebreaker Party

#### Foraminiferal Introduction

Day 1 (11 June) *Kaminski & Frontalini*

Welcoming speech and course presentation

Famous Names and Milestones in the Study of Foraminifera  
Introduction to Foraminifera & Review of Foraminiferal Suborders  
Sample Preparation Techniques  
Lab Task 1: Identification of foraminiferal wall composition, coiling, chamber arrangement, and apertures of benthic foraminifera  
Lab Task 2: Dividing forms by wall structure, coiling and chamber arrangement  
Material: Nova Scotia Agglutinated Foraminifera & Mediterranean Sea

Day 2 (12 June) Kaminski, Cetaan & Frontalini

Morphology and Classification of Benthic Foraminifera  
Miliolids, Buliminids and small Rotaliids  
Collecting modern foraminifera  
Lab Task 1: Identification of benthic foraminiferal genera: wall composition, coiling, chamber arrangement and shape, and apertures  
Material: Arabian Gulf and Adriatic Sea

Day 3 (13 June) Kaminski & Cetaan

Introduction to Planktonic Foraminifera and their Classification  
Morphology and Classification of Planktonic Foraminifera  
Lab task 1: Identification of wall structures, coiling and chamber morphology  
Material: Sargasso Sea and South Atlantic

Day 4 (14 June) Hohenegger & Gooday

Biology of Foraminifera  
Ecology and taphonomy of foraminifera  
Lab 1: Statistical analyses for ecological and paleoecological studies  
Lab Task 1: Using statistical program packages

Day 5 (15 June) Pawlowski & Gooday

Introduction to molecular genetics of Foraminifera  
Taxonomy, distribution and ecology of monothalamous foraminifera including deep-sea, freshwater and terrestrial species  
Lab 1: Observations of living foraminifera  
Lab 2: Samples preparation for DNA extraction  
Lab 3: Sampling methods for living foraminifera

**Larger Benthic Foraminifera**

Day 6 (16 June) Hohenegger, Papazzoni & Briguglio

Biology, bauplan and functional morphology, carbonate production (recent)  
Most important groups of LBF in the Phanerozoic  
LBF morphology using loose specimens, thin sections, microCT  
Upper Palaeozoic shallow water Fauna: the Fusulinina Suborder  
Shallow water K/T boundary and Palaeocene LBF associations  
Lab: MicroCT; Fusulinina in thin sections; Paleocene LBF

Day 7 (17 June) Papazzoni & Briguglio

The Eocene biodiversity (I): Nummulitids  
The Eocene biodiversity (II): Orthophragminids  
The Eocene biodiversity (III): Alveolinids  
Lab: Nummulitids, Orthophragminids, Alveolinids

Day 8 (18 June) Hohenegger, Papazzoni & Briguglio

LBF biostratigraphy, Opperzones and applications  
Oligo-Miocene LBF associations  
Modern LBF: ecology, distribution (now and future), applications  
Lab 1: Lepidocyclinids and Miogypsinids  
Lab 2: Paleodepths estimation by means of LBF  
Evening Session: "Foraminiferal Party". Slide presentations by ISF participants - five minutes each: five photos, five PowerPoint slides

Day 9 (19 June) Hughes

- Early Carboniferous foraminifera and their use for paleoenvironmental interpretation  
Lab and Task 1: Asbian foraminiferal identification using thin sections (paleoenvironment study)
- Late Permian foraminifera of the Middle East and their biosteering application
- Triassic micropalaeontology of the Middle East: age application  
Lab and Task 2: Triassic foraminiferal identification using photomicrographs (age determination)
- Jurassic foraminifera of the Middle East: age, paleoenvironment and implications for cycle definition  
Lab & Task 3: Jurassic foraminiferal identification using thin sections (age determination)
- Jurassic foraminifera of the Middle East (Oxfordian): age and paleoenvironment  
Lab & Task 4: Jurassic (Oxfordian) foraminiferal identification using photomicrographs: paleoenvironment exercise
- Late Jurassic hypersalinity events: foraminiferal & associated microfaunal/floral responses  
Lab & Task 5: Jurassic hypersaline foraminiferal identification using photomicrographs: paleoenvironment study
- Cretaceous foraminifera of the Middle East: age, paleoenvironment and implications for cycle definition  
Lab & Task 6: Cretaceous (Aptian) foraminiferal identification using photomicrographs: age and paleoenvironment exercise
- Neogene foraminiferal applications in the Red Sea hypersaline-associated succession

Day 10 (20 June) Day off

**Planktonic Foraminifera**

Day 11 (21 June) Kucera

- Modern Planktonic Foraminifera
- Taxonomy of modern planktonic foraminifera
- Structure of cytoplasm, Feeding, Symbionts, Ontogeny
- Reproductive and seasonal cycles, Depth habitats
- Origin of Planktonic Foraminifera
- Biogeography of Planktonic Foraminifera
- Faunal Provinces, Climatic Zones and Water Masses
- Lab 1: Recent assemblages - wall texture - shell morphology
- Task 1: Identification of latitudinal zones based on PF

Day 12 (22 June) Petrizzo

- Paleogene Planktonic Foraminifera
- Biostratigraphy
- Notes on Paleooceanography
- Lab 1: Paleogene index species
- Task 1: Morphology of Paleogene PF
- Task 2: Identification of biozones

Day 13 (23 June) Petrizzo

- Mesozoic Planktonic Foraminifera
- Biostratigraphy
- Notes on Paleooceanography
- Lab 1: Upper Jurassic to Maastrichtian index species
- Task 1: Morphology of Cretaceous PF
- Task 2: Identification of biozones
- Industry Applications of Micropaleontology

Day 14 (24 June) Kaminski

- Neogene Planktonic Foraminifera
- Miocene and Pliocene Planktonic Foraminifera
- Pleistocene Planktonic Foraminifera
- Biochronology and Zonal schemes

Lab 1: Miocene index species - Pliocene-Pleistocene index species  
Task 1: Identification of biozones  
Task 2: Identification of glacial and interglacial assemblages

### **Smaller Benthic Foraminifera**

#### Day 15 (25 June) Kaminski

Morphogroups and functional morphology of smaller benthic foraminifera  
Ecology and distribution of benthic Foraminifera  
Lab: Databases, Taxonomy of benthic foraminiferal suborders  
Task 1: Water depth estimation based on SBF  
Task 2: Identification of SBF morphogroups

#### Day 16 (26 June) Kaminski & Frontalini

Community Structure, Life History, and Reproduction  
Oceanographic proxies, benthic foraminiferal microhabitats, and productivity/oxygenation  
Benthic foraminifera and water mass properties  
Atlantic and Mediterranean shallow water benthic Foraminifera  
Lab: Modern smaller benthic foraminifera: Foraminiferal genera and assemblages  
Task 1: Productivity/oxygen estimation based on SBF  
Task 2: Environmental Interpretation  
Keynote lecture by Laia Alegret: Deep-sea drilling and the JOIDES Resolution

#### Day 17 (27 June) Alegret & Cetaan

Biostratigraphy and Paleoecology of benthic foraminifera  
The ODP record, Cretaceous/Paleogene boundary, Paleocene-Eocene Thermal Maximum, Eocene hyperthermals and late Eocene  
Lab: A review of late Cretaceous to Paleogene faunas and index taxa  
Task 1: Paleodepth estimation based on upper depth limits of SBF  
Task 2: Paleoproductivity/paleoxygen estimation based on SBF

#### Day 18 (28 June) Kaminski & Cetaan

Cenozoic Paleoceanographic events and SBF  
Neogene of West Africa, and Gulf of Mexico: The ACEX Arctic Drilling Expedition  
Lab: The Paleogene record; North Sea, Trinidad, Angola, Carpathians, Gubbio  
A review of Jurassic to late Cretaceous faunas, Bering Sea Pleistocene faunas  
Task 1: Flysch type fauna identification – index taxa  
Task 2: Oxygen minimum zone fauna  
Rigs and Stuff  
Wellsite Micropaleontology  
Social Dinner/Aperitif & Graduation ceremony

**Min number of participants: 20**

**Final deadline May 1<sup>st</sup>, 2025**

#### **Registration fees**

Early registration (registration and payment before February 28<sup>th</sup>, 2025)

PhD/MSc Students:

One module	Euro 420
Two modules	Euro 650
Three modules	Euro 810
Full course	Euro 920

Academic/Industrial staff:

One module	Euro 610
Two modules	Euro 920
Three modules	Euro 1120
Full course	Euro 1300

Late registration (registration and payment after February 28<sup>th</sup>, 2025)

PhD/MSc Students:

One module Euro 490  
Two modules Euro 790  
Three modules Euro 990  
Full course Euro 1070

Academic/Industrial staff:

One module Euro 700  
Two modules Euro 1100  
Three modules Euro 1300  
Full courses Euro 1400

The fee includes:

- lectures 4-day course
- lecture notes, handouts, PowerPoint, pdf of reprints
- icebreaker party
- refreshments
- aperitif
- social dinner

**How to register**

Registration must be done by submitting the registration form that can be download from <http://isf.tmsoc.org> website, or by sending an email to [isf@tmsoc.org](mailto:isf@tmsoc.org)

The course fee must be paid to the following bank account:

Registration is upon receipt of payment in Euro €) by direct bank transfer to:

Account name: Institute for Climate Change Solutions

Address: via Sorchio snc, 61040 Frontone (PU), Italy

Bank name: Intesa Sanpaolo S.p.A.

BIC: BCITITMMXXX

**IBAN: IT24H0306909606100000172103 FOR NOT SEPA AREA**

**IBAN: IT85D0306967684510783725482 FOR ONLY SEPA AREA**

Bank address: Piazza Paolo Ferrari 10, 20121 Milano (MI), Italy

Currency of account: Euro (€)

Reason for payment: participant's name and 16th I.S.F. (e.g., *John Smith – 16th I.S.F.*)

As soon as you have a copy of the bank transfer, please send it by e-mail to [isf@tmsoc.org](mailto:isf@tmsoc.org)

**Correspondence and Information:**

[isf@tmsoc.org](mailto:isf@tmsoc.org)

**Lectures**

Prof. Michael A. Kaminski, King Fahd University of Petroleum & Minerals (Saudi Arabia)

Prof. Fabrizio Frontalini, Urbino University (Italy)

Prof. Laia Alegret, University of Zaragoza (Spain)

Prof. Antonino Briguglio, University of Genova (Italy)

Prof. Claudia Cetean, ENI (Italy)

Prof. Andrew Gooday, National Oceanography Centre (UK)

Prof. Johann Hohenegger, University of Vienna (Austria)

Prof. Geraint Wyn Hughes, King Fahd University of Petroleum & Minerals (Saudi Arabia)

Prof. Michal Kucera, MARUM, University of Bremen (Germany)

Prof. Cesare Andrea Papazzoni, University of Modena e Reggio Emilia (Italy)

Prof. Jan Pawlowski, Institute of Oceanology Polish Academy of Sciences (Poland)

Prof. Maria Rose Petrizzo, Milano University (Italy)

**Scientific Directors & Coordinators**

Prof. Michael A. Kaminski, King Fahd University of Petroleum & Minerals (Saudi Arabia)

Prof. Fabrizio Frontalini, Urbino University (Italy)

Prof. Maria Rose Petrizzo, Milano University (Italy)  
Prof. Claudia Cetean, ENI (Italy)

### **Requirements**

The course is primarily intended for young researchers at the PhD or MSc stages of their careers and industrial staff working with Foraminifera, Meiofauna, Micropaleontology, Paleooceanography, Paleocology, Climate History. Applicants will primarily be selected on the basis of the relevance of the course for their current work. Because the course is oversubscribed, places on the course are reserved in the order of payments received. Please register early in order to reserve your place.

### **Code of Conduct**

The course recognizes and adheres to the Code of Conduct of The Micropalaeontological Society.

### **Location**

The course will be held in Urbino in the lecture room C2 of the Area Scientifico Didattica Paolo Volponi (via Aurelio Saffi, 15, 61029 Urbino) of the Urbino University (Italy).

### **Accommodation and meals**

It is possible for participants to book accommodation at the “Piero della Francesca” that is at 15-min walking distance from the Area Scientifico Didattica Paolo Volponi and is regularly served by bus to the city center. Most of the rooms are double-occupancy and all have en-suite bathrooms, only a few single rooms are available and will be assigned in enrollment order upon request. The rooms are furnished, air-conditioned, clean and comfortable. The cost of the accommodation is € 23 in double and € 29 in single per night (breakfast not included) for students and is € 32 in double and € 40 in single per night (breakfast not included) for academic and industrial staff. The accommodation cost is paid upon your arrival by debit/credit card at the reception desk of “Piero della Francesca”. Cafeteria meals may be obtained by a rechargeable debit card (each participant will receive a meal card at reception) at the nearby university residential block in the "Mensa del Duca" (5-minute walk from Area Scientifico Didattica Paolo Volponi). The cost is € 7.5 for a complete meal or € 5.5 for a reduce meal for student and € 10.0 for a complete meal or € 7.0 for a reduce meal for academic and industrial staff. Urbino City Tax € 7.50 for the entire stay.

### **Insurance**

The registration fees do not include insurance of any kind. Participants are advised to take out appropriate insurance, including cover for travel, accommodation, medical assistance and personal possessions.

**The second circular** with detailed information about the course along with the accommodation form for the selection of Piero della Francesca reservation are scheduled to be distributed in early March 2025 and will be only sent to people who replied to the first circular.

***We look forward to seeing you in Urbino!***

For more information, please visit our new website at [www.isf.tmsoc.org/](http://www.isf.tmsoc.org/)

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