



# International School on Foraminifera

## 10<sup>th</sup> Course

Urbino – 11<sup>th</sup> – 30<sup>th</sup> June, 2017

### First Circular

#### Course Description

The 10<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 (11-16 June), Larger Benthic Foraminiferal Course (17-20 June), Planktonic Foraminiferal Course (22-26 June) and Smaller Benthic Foraminiferal Course (27-30 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

*11 June Sunday* Icebreaker Party

#### Foraminiferal Introduction

Day 1 (12 June Monday) *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 (13 June Tuesday) **Kaminski, Cetean & 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 (14 June Wednesday) **Kaminski & Cetean**

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 (15 June Thursday) **Hohenegger & Geslin**

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 (16 June Friday) **Pawlowski**

Introduction to molecular genetics of Foraminifera

Lab 1: Observations of living foraminifera & culturing techniques

Lab 2: Samples preparation for DNA extraction

Lab 3: Sampling methods for living foraminifera

### **Larger Benthic Foraminifera**

Day 6 (17 June Saturday) **Hohenegger, Papazzoni & Briguglio**

Biology, bauplan and functional morphology, carbonate production (recent)

Most important groups of LBF in the Phanerozoic

Carbonate production and taphonomy (biostratigraphy and diagenesis), accumulation (inclusive nummulite banks)

LBF morphology using loose specimens, thin sections, microCT (Lab 1)

Upper Palaeozoic shallow water Fauna: the Fusulinina Suborder

Lab 1: Fusulinina in thin sections

Day 7 (18 June Sunday) **Papazzoni & Briguglio**

Shallow water K/T boundary and Palaeocene LBF associations

The Eocene biodiversity (I): the genus Nummulites

The Eocene biodiversity (II): the genus Alveolina

Lab 1: Palaeocene, Alveolina & Nummulites

Day 8 (19 June Monday) **Hohenegger, Papazzoni & Briguglio**

The Eocene biodiversity (III): the Orthophragminids

Oligo-Miocene LBF associations

Lab 1: Orthophragminids, Lepidocyclinids and Miogypsinids

LBF biostratigraphy, Opper zones and applications

Modern LBF: ecology, distribution (now and future), applications

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 (20 June Tuesday) **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 (21 June Wednesday)

Day-off

### **Planktonic Foraminifera**

Day 11 (22 June Thursday) **Kaminski**

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 (23 June Friday) **Kucera**

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

Day 13 (24 June Saturday) **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 14 (25 June Sunday) **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

Day 15 (26 June Monday) Kaminski & Frontalini

Morning field excursion to the Gubbio area  
Cretaceous-Paleogene sequence at Contessa Highway and Contessa Road  
Paleocene-Eocene Thermal Maximum and other hyperthermals at Contessa Road  
Oceanic Anoxic Event 2 “Bonarelli” at Contessa Quarry  
K/Pg boundary at Bottaccione  
Oceanic Anoxic Event 1a “Selli” at Gorgo a Cerbara  
Afternoon tourist visit to Gubbio  
Social Dinner

**Smaller Benthic Foraminifera**

Day 16 (27 June Tuesday) Kaminski & Gooday

Taxonomy, distribution and ecology of monothalamous foraminifera including deep-sea, freshwater and terrestrial species  
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 17 (28 June Wednesday) 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

Day 18 (29 June Thursday) Cetean & Alegret

Biostratigraphy and Paleocology 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  
Aperitif

Day 19 (30 June Friday) Kaminski & Foy

Cenozoic Paleooceanographic 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 Micropalaeontology

**Min number of participants: 10**

**Final deadline May 5<sup>th</sup>, 2017**

**Registration fees**

Early registration (application sent and payment before February 3<sup>rd</sup>, 2017)

PhD/MSc Students:

One module           £ 290 (Euro 380)

Two modules	£ 450 (Euro 590)
Three modules	£ 570 (Euro 750)
Full course	£ 660 (Euro 860)
Academic/Industrial staff :	
One module	£ 430 (Euro 560)
Two modules	£ 650 (Euro 850)
Three modules	£ 800 (Euro 1050)
Full course	£ 900 (Euro 1175)

Late registration (application and payment sent after February 3<sup>rd</sup>, 2017)

**PhD/MSc Students:**

One module	£ 330 (Euro 430)
Two modules	£ 540 (Euro 705)
Three modules	£ 700 (Euro 915)
Full course	£ 750 (Euro 980)
Academic/Industrial staff :	
One module	£ 480 (Euro 620)
Two modules	£ 760 (Euro 995)
Three modules	£ 910 (Euro 1190)
Full courses	£ 950 (Euro 1250)

The fee includes:

- lectures (4-day course)
- lecture notes, handouts, PowerPoint, pdf of reprints
- icebreaker party
- refreshments
- aperitifs
- excursion
- social dinner

**How to make an application**

Registration must be done by submitting an application 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: Fundacja Mikropaleontologiczna Micropress Europe

Bank address: Raiffeisen Bank Polska S.A., ul. Piekna 20, 00-549 Warszawa

SWIFT: RCBWPLPW

IBAN: PL91 1750 0012 0000 0000 2841 0832

Currency of account: Euro (€). (Please contact us for further instructions if you wish to pay in Pounds Sterling or in US Dollars).

Reason for payment: participant's name and 10<sup>th</sup> I.S.F. (e.g. John Smith – 10<sup>th</sup> 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)

Dr. Fabrizio Frontalini, Urbino University (Italy)

Prof. Laia Alegret, University of Zaragoza (Spain)

Dr. Antonino Briguglio, University of Brunei Darussalam (Brunei)

Dr. Claudia Cetean, Robertson Ltd (UK)

Prof. Rodolfo Coccioni, Urbino University (Italy)

Dr. Danielle Foy, Blue Phoenix Geological Ltd. (UK)

Prof. Emmanuelle Geslin, University of Angers (France)

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, University of Geneva (Switzerland)  
Prof. Maria Rose Petrizzo, Milano University (Italy)

#### Scientific Directors & Coordinators

Prof. Michael A. Kaminski, King Fahd University of Petroleum & Minerals (Saudi Arabia)  
Dr. Fabrizio Frontalini, Urbino University (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, Micropalaeontology, Paleocyanography, 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.

#### Location

The course will be held in Urbino at the "Collegio Internazionale". The "Collegio Internazionale" is in the historic center of Urbino, two blocks from the main square (please visit, <http://www.collegiointernazionaleurbino.it/en/1/galleria-immagini.html>).

#### Accommodation and meals

It is possible for participants to book accommodation at the "Collegio Internazionale" (University Hall). Most of the rooms are double-occupancy and have en-suite bathrooms, only a few single rooms are available and will be assigned in enrollment order. The rooms are furnished, air-conditioned, clean and comfortable. The cost of the accommodation is €18 in double and €25 in single per night including breakfast. The accommodation cost is paid upon your arrival in cash or by debit/credit card at the reception desk of Collegio Internazionale. 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" (1-minute walk from the Collegio Internazionale). The cost is either €10 for a complete meal (first course, second course, side dish, bread, fruit and water) or €6 for a smaller meal (main course, two side dishes, bread, fruit and water). 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 and personal possessions.

**The second circular** with detailed information about the course is scheduled to be distributed in early March 2017 and will be 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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