

Hauptseminar: Plan

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1 Participants

Executive director: OK.

I Board:

- 1 AB
- 2 UB
- 3 OK
- 4 FM
- 5 PM
- 6 MR
- 7 MS
- 8 AGS
- 9 JVT

II Other participants (with “big brother”)

- 1 KA
- 2 JB
- 3 MH
- 4 Ken Johnson (KA)
- 5 Matthew Lewsey (OK)
- 6 Will Harwood (FM)
- 7 Liam O’Reilly (PM)
- 8 Gift Samuel (AB)
- 9 Temeshgen Kahsai (MR)

2 Book

José Luiz Fiadeiro *Categories for Software Engineering* [3]

1. Chapter 1 „Introduction“
2. Part I „Basics“
 - Chapter 2 „Introducing Categories“
 - .1 „Graphs“
 - .2 „Categories“
 - .3 „Distinguished Kinds of Morphisms“
 - Chapter 3 „Building Categories“
 - Chapter 4 „Universal Constructions“
 - Chapter 5 „Functors“
3. Part II „Advanced Topics“
 - Chapter 6 „Functor-Based Constructions“
 - Chapter 7 „Adjunctions“
4. Part III „Applications“
 - Chapter 8 „CommUnity“
 - Chapter 9 „Architectural Description“
 - Chapter 10 „An Algebra of Connectors“

2.0.1 Further literature

1. Background
 - (a) F. William Lawvere and Stephen H. Schanuel *Conceptual Mathematics: A first introduction to categories* [7]
2. Completion
 - (a) J. Lambek und P.J. Scott *Introduction to higher order categorical logic* [4], Part 0 „Introduction to category theory“
 - (b) Thomas S. Blyth *Categories* [2]
 - (c) Benjamin C. Pierce *Basic Category Theory for Computer Scientists* [8]
3. Outlook
 - (a) Saunders Mac Lane *Categories for the Working Mathematician* [5]
 - (b) Jiří Adámek, Horst Herrlich und George E. Strecker *Abstract and Concrete Categories (The Joy of Cats)* [1]
 - (c) J. Lambek und P.J. Scott *Introduction to higher order categorical logic* [4]
 - (d) Saunders Mac Lane und Ieke Moerdijk *Sheaves in Geometry and Logic: A First Introduction to Topos Theory* [6]

3 Ordinary seminar units

I First semester

- (a) 24.10.2006 + 31.10.2006, OK:
 - i. [3]:
 - A. 2.1, 2.2
 - B. 3.1.4, 3.1.5
 - C. 3.2.1
 - D. 5.1.1, 5.1.4
 - E. 7.1.2, 7.1.3, 7.1.6
- (b) 8.11.2006 + 15.11.2006, Ken (KA). Foundations: subcategories, special morphisms, special functors, special objects, product category, dual category, diagrams
 - i. [3]:
 - A. 2.2.10, 2.2.11
 - B. 2.3
 - C. 3.1
 - D. 3.2.2, 3.2.3
 - E. 3.3.1 - 3.3.7
 - F. 4.1
 - G. 5.1.1 - 5.1.12
 - ii. Support from [1]: Chapter 3, 4, 7.
 - iii. Support from [2]: Chapter 1, 2.
 - iv. Support from [8]: Chapter 1.
- (c) 22.11.2006 + 29.11.2006, UB: Adjunctions
 - i. [3]:
 - A. 3.3.8 - 3.3.12
 - B. 7.1
 - C. 7.2
 - D. 7.3
 - ii. Support from [1]: Chapter 18, 19.
 - iii. Support from [2]: Chapter 6, 7, 8.
 - iv. Support from [8]: Chapter 2.
 - v. Support from [4]: Sections 0.2, 0.3, 0.4.
- (d) 6.12.2006 (in Faraday E due to Open Day) + 13.12.2006, ML (OK): Limits and universal constructions
 - i. [3]:
 - A. 4.2 - 4.4
 - B. 5.2
 - ii. Support from [1]: Chapter 10 - 13.
 - iii. Support from [2]: Chapter 3.
 - iv. Support from [8]: Sections 1.5 - 1.9.
 - v. Support from [4]: Section 0.5.

II Second part:

- (a) 7.2.2006 + 14.2.2006, Will (FM) : Concrete categories I
 - i. [3]:
 - A. 6.1 - 6.4.
 - ii. Support from [1]: Chapter 5, 8.
- (b) 21.2.2006 + 28.2.2006, ???: Concrete categories II
- (c) 7.3.2006 + 14.3.2006, Gift (AB): Examples from the book I
 - i. [3]:
 - A. Examples of Chapter 2 - 5.
- (d) 21.3.2006 + ???, Liam (PM): Institutions I
 - i. [3]:
 - A. 6.5
 - B. 7.4, 7.5.
- (e) Examples from the book II
 - i. [3]:
 - A. Examples of Chapter 6, 7.
- (f) Institutions II

4 Additional seminar units

1. UB + PM : Cartesian closed categories and monads
2. MR: Institutions
3. FM: Bisimulation

Literatur

- [1] Jiří Adámek, Horst Herrlich, and George E. Strecker. *Abstract and Concrete Categories (The Joy of Cats)*. Published under the GNU Free Documentation License, January 2004. Available at <http://katmat.math.uni-bremen.de/acc>.
- [2] Thomas S. Blyth. *Categories*. Longman, 1986. ISBN 0-582-98804-7 (paperback).
- [3] José Luiz Fiadeiro. *Categories for Software Engineering*. Springer, 2005. ISBN 3-540-20909-3.
- [4] J. Lambek and P.J. Scott. *Introduction to higher order categorical logic*, volume 7 of *Cambridge studies in advanced mathematics*. Cambridge University Press, 1988. ISBN 0 521 35653 9.
- [5] Saunders Mac Lane. *Categories for the Working Mathematician*. Springer-Verlag, New York, 1971. ISBN 0-387-90036-5.
- [6] Saunders Mac Lane and Ieke Moerdijk. *Sheaves in Geometry and Logic: A First Introduction to Topos Theory*. Universitext. Springer, 1992. ISBN 0-387-97710-4; QA169.M335.

- [7] F. William Lawvere and Stephen H. Schanuel. *Conceptual Mathematics: A first introduction to categories*. Cambridge University Press, 1997. ISBN 0-521-47817-0; reprint 2005.
- [8] Benjamin C. Pierce. *Basic Category Theory for Computer Scientists*. Foundations of Computing. The MIT Press, 1991. ISBN 0-262-66071-7; QA76.9.M35P54.