



Pharmacy in Germany

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Preparing the Pharmacist of the Future

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Pharmaceutical Institutes in Germany



22 sites
14,000 students

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Pharmaceutical Education in Germany

Legislation:

- The education of pharmacists in Germany is regulated by Federal Law of July 7, 1989.
- This law was changed in 2000 according to the new needs of pharmaceutical education.

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Principles

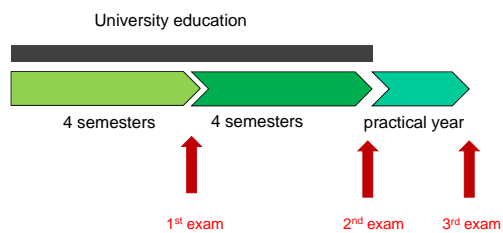
One final degree for pharmacists only, irrespective of their further profession in

- a community pharmacy
- the industry
- a hospital
- academia

All have the same basic education and are registered as pharmacists.

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Overview of the education



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Overview of the education

Semester 1-4:

First part of the pharmaceutical education

- First examination: multiple choice
- General, inorganic and organic chemistry
 - Basics of pharmaceutical biology and human biology
 - Basics of physics, physical chemistry and pharmaceutical technology (pharmaceutics)
 - Basics of pharmaceutical analytics

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Overview of the education

Semester 5-8:

Second part of the pharmaceutical education

Second examination: oral

- Pharmaceutical/medicinal chemistry
- Pharmaceutical biology
- Pharmaceutical technology/ biopharmacy
- Pharmacology and toxicology
- Clinical pharmacy

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Overview of the Pharmaceutical Education:

Third part of the pharmaceutical education =

Preregistration year

(in community pharmacy, industry, hospital, academia)

Third examination: oral

- Pharmaceutical practice
- Pharmaceutical law

Registration as a pharmacist

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Subjects of the first part of the pharmaceutical education

- A: **General chemistry of drugs, adjuvants and pollutants** (462 hours, including 336 hours of lab courses, 56 hours of seminars and 70 hours of lectures)
- B: **Pharmaceutical analytics** (392 hours, 308 lab courses and 84 lectures)
- C: **Scientific basics, mathematics and pharmaceutical technology** (280 hours, 140 lab courses, 14 seminars and 126 lectures)
- D: **Basics of biology and human biology** (392 hours, 210 lab courses and 182 lectures)

and a practical period of 8 weeks in community pharmacy

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Subjects of the second part of pharmaceutical education

- E: **Biochemistry and pathobiochemistry** (196 hours, 98 lab course and 98 lectures)
- F: **Pharmaceutical technology** (pharmaceutics) and biopharmacy (364 hours, 196 lab courses, 42 seminars and 126 lectures)
- G: **Biogenic drugs** (238 hours, 84 lab courses, 42 seminars and 112 lectures)
- H: **Medicinal chemistry and analyses of drugs** (420 hours, 280 lab courses and 140 lectures)
- I: **Pharmacology and clinical pharmacy** (406 hours, 112 lab courses, 98 seminars and 196 lectures)
- K: **Elective course** (112 hours)

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Total hours of the education

- 1456 hours of lab courses (44,6%)
- 672 hours of seminars (20,6%)
- 1134 hours of lectures (34,0%)

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Conclusions:

The education of pharmacists in Germany is a

- compromise between the needs of community pharmacy and of industrial and academia orientated pharmacy.
- solid basis for different types of post-graduate education within natural and medicinal sciences.

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Pharmaceutical Biology

drug-producing organisms
natural products

molecular biology
biotechnology
cell biology
biologicals

Pharmaceutical Chemistry

structure-activity relationships
analytical methods (omics technologies)
bioanalytics
imaging technologies

molecular aspects of biotransformation

Pharmaceutical Technology

new drug formulation methods (e.g. melt extrusion)

new drug delivery forms and devices

biopharmaceutical test systems (in-vitro-/in-vivo-correlations)

drug stabilization

Pharmacology

central subject in pharmaceutical education with many crosslinks

addresses action of drugs in the human body

pharmacokinetics

new therapeutic strategies

Clinical Pharmacy

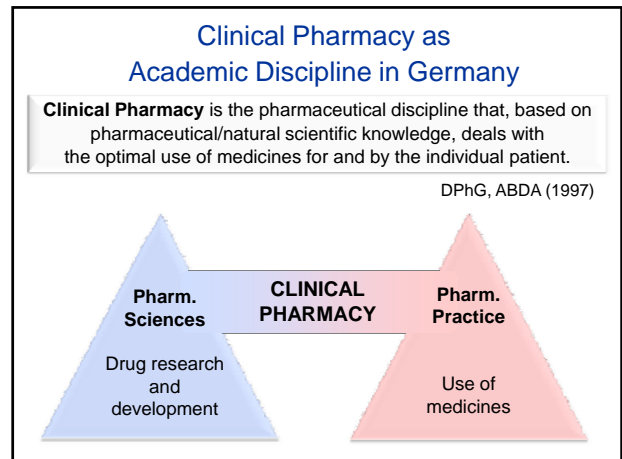
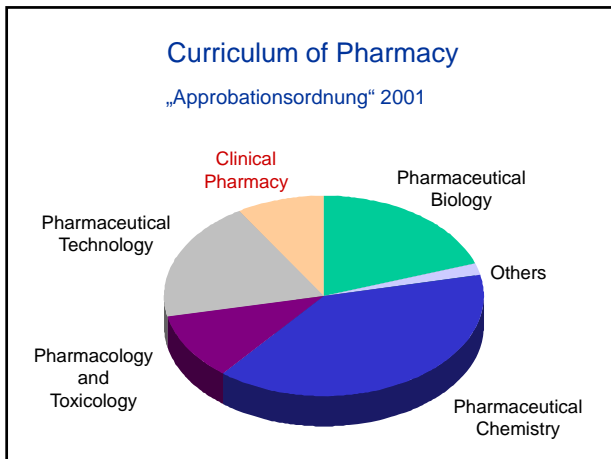
Challenge Patient-oriented Pharmacy

- Medication Safety as interprofessional challenge



- Medication Management as new pharmaceutical service





Clinical Pharmacy Education

Approbatonsordnung 2001

- Introduction of new courses

Title	Type	No. of hours
Clinical Pharmacy	Seminar	84
Pharmacotherapy	Lecture & Exercise	56
Pharmacoepidemiology & Pharmacoconomics	Lecture & Seminar	28
Total		168

- Introduction of a state examination in „Clinical Pharmacy“

Clinical Pharmacy Education

University of Bonn 2015

3rd to 4th Year (6th to 8th Semester)

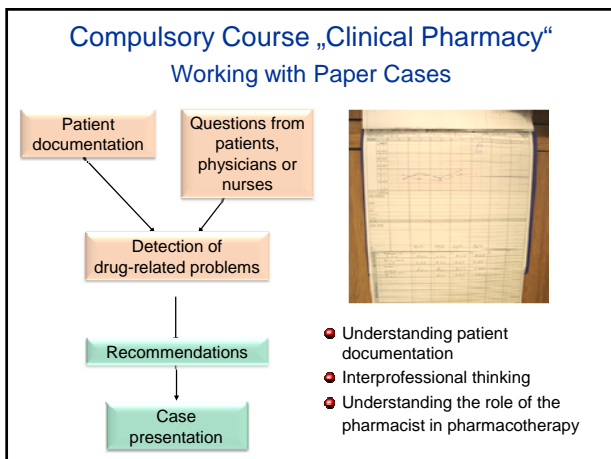
⇒ Lectures „Clinical Pharmacy I, II and III“ (70 h)

4th Year (8th Semester)

⇒ Compulsory Course „Clinical Pharmacy“ (98 h)
 ⇒ Compulsory Course „Pharmacotherapy“ (28 h)
 ⇒ Elective Course „Pharmaceutical Care“ (112 h)

1st Year (1st Semester)

⇒ Lecture „Patient-oriented Pharmacy“ (14 h)



Compulsory Course „Pharmacotherapy

Patients in the Lecture Hall

- Invitation of patients together with their physicians/pharmacists
- Application of guidelines to treat the individual patient
- Discussion on the individual therapy plan and drug-related problems

Elective Course „Pharmaceutical Care“ Communication Workshop

- Communication with patients and other health care professionals
- Ethical aspects
- Data protection



Elective Course „Pharmaceutical Care“ Working with Real Cases



One Year „Pharmacy Practice“

- At least 6 months in the community pharmacy
- Seminars in pharmacy practice
- „Academic education pharmacy“ as future concept?



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Pharmacy 2020

DPhG
Deutsche
Pharmazeutische
Gesellschaft e.V.

Future Topics in Clinical Pharmacy

- Medication Safety
- Medication Management
- Personalized Pharmacotherapy
- Evidence-based Pharmacy

Preparing the Pharmacist of the Future

What is needed?

- Standards for Clinical Pharmacy undergraduate education
- Integration of future topics in the curriculum
- More time with patients already in undergraduate education
- Professional training in medication management during the practical year
- Development of postgraduate courses