1. General Information about the program

Program code : 0122
Program Name : The Pharmacy Program (B.E. 2555)
Degree : Doctor of Pharmacy (Pharm.D.)

Note : All courses are teaching in Thai language at the main campus. This program is approved by The Pharmacy Council of Thailand. The graduate has to take an exam at The Pharmacy Council of Thailand to attain a Thai Pharmacy License to be able to legally work in Thailand.

Type of study : Full time only
The first semester: August-December
The second semester: January-May
The third semester: June-July
Tuition Fee : Following on the announce of Ubon Ratchathani University (UBU) and Faculty of Pharmaceutical Sciences, UBU.

2. Qualification

1. Student must get The Cumulative Grade Point Average (GPAX) in complete program not less than 2.00
2. Student must get The Cumulative Grade Point Average (GPAX) in professional course not less than 2.00 (calculating from grade of pharmacy and pharmaceutical subjects; 15xx xxx)
3. Student must pass Comprehensive Exam which approved by Faculty of Pharmaceutical Sciences, Ubonratchathani University.

3. Courses

The Doctor of Pharmacy requires completion of courses totaling 224 Credits. This consists a two year foundation program of mathematics, languages (Thai and English) and Basic Pharmaceutical Sciences. Further specialist courses are offered in the 3rd - 5th year, including the pharmacy practice and Pharmaceutical Clerkship in Hospital, Drug store, Industrial Pharmacy and others in the 6th year of program.

Note: The course name is in the format of
FFFF XXX Course name   C(L-P-S) where,
FFFF is the faculty code
XXX is the course number
C is a total credit units for this course.
L is a number of lecture hours per week
P is a number of practical hours per week
S is a number of self-study hours per week

4. Program Structure

1. General Education [30 units]

1.1. Languages and Linguistics [14-15 units]

1.1.1 Thai language [2-3 units]
1411 101 Thai Language and Communication 3 (3-0-6)
1411 104 Thai Language Arts 2 (2-0-4)

1.1.2 English [12 units]
1421 102 Foundation English I 3 (3-0-6)
1421 103 Foundation English II 3 (3-0-6)
1421 208 Academic English 3 (3-0-6)
1421 307 English for Health Science 3 (3-0-6)

1.2 Mathematics and Sciences [6 units]
1104 113 Mathematics and Computers in Daily Life 3 (3-0-6)

Selecting the another 3 units from these following lists:
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1101 141</td>
<td>Sciences in Daily Life</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1101 146</td>
<td>Biodiversity and Climate Change</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1101 147</td>
<td>Environment and Life</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1101 148</td>
<td>Life and Microorganisms</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1102 109</td>
<td>Physical Science in Daily Life</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1103 128</td>
<td>Household Electrical Appliance in Daily Life</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1200 108</td>
<td>Food for Life</td>
<td>3 (3-0-6)</td>
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1.3. Humanities and Social Sciences 9 units

1.3.1 Humanities 3 units

Selecting 3 units from these following lists:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1432 110</td>
<td>Man and Reasoning</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1431 102</td>
<td>Philosophy in Life and Society</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1431 101</td>
<td>Man and Aesthetics</td>
<td>3 (3-0-6)</td>
</tr>
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<td>1432 101</td>
<td>Thai Culture</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1438 100</td>
<td>Arts for Emotional Refinement</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1435 100</td>
<td>Music and Life</td>
<td>3 (3-0-6)</td>
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1.3.2 Social Sciences 6 units

Selecting 6 units from these following lists:

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<th>Units</th>
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</thead>
<tbody>
<tr>
<td>1441 100</td>
<td>Man and Society</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1442 100</td>
<td>Contemporary Culture</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1443 200</td>
<td>Law and Society</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1445 100</td>
<td>Dynamics of Thai Society</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1446 101</td>
<td>Art of Living</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1447 200</td>
<td>Man and Communication</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1708 200</td>
<td>Buddhist Economics and Sufficiency Economy</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1700 100</td>
<td>Modern Business Management</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1703 110</td>
<td>Finance Skills in Daily Life</td>
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1.4 Physical Education 1 units

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<tr>
<td>1439 100</td>
<td>Exercise for Health</td>
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<td>1439 101</td>
<td>Sports for Health</td>
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2. Core curriculum  

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<tr>
<td></td>
<td><strong>2.1 Basic Knowledge</strong></td>
<td>24 units</td>
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<tr>
<td>1101 111</td>
<td>Biology I</td>
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<tr>
<td>1101 153</td>
<td>Biology II</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1102 100</td>
<td>Chemistry I</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1102 101</td>
<td>Chemistry Laboratory I</td>
<td>1 (0-3-0)</td>
</tr>
<tr>
<td>1102 102</td>
<td>Chemistry II</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1102 103</td>
<td>Chemistry Laboratory II</td>
<td>1 (0-3-0)</td>
</tr>
<tr>
<td>1102 110</td>
<td>Organic Chemistry</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1102 111</td>
<td>Organic Chemistry Laboratory</td>
<td>1 (0-3-0)</td>
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<td>1102 120</td>
<td>Physical Chemistry</td>
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<td>1104 141</td>
<td>Elementary Statistics</td>
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<td></td>
<td><strong>2.2 Core course</strong></td>
<td>93 units</td>
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<td>1501 100</td>
<td>Pharmacy Orientation</td>
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<td>1501 400</td>
<td>Pharmaceutical Jurisprudence and Professional Ethics</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1501 401</td>
<td>Principles of Research in Pharmacy</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1501 502</td>
<td>Senior Project</td>
<td>3 (0-9-0)</td>
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<td>1501 503</td>
<td>General Professional Practice</td>
<td>6 (0-27-0)</td>
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<td>1502 220</td>
<td>Biochemistry and Molecular Biology I</td>
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<td>1502 221</td>
<td>Biochemistry and Molecular Biology Laboratory I</td>
<td>1 (0-3-0)</td>
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<td>1502 222</td>
<td>Biochemistry and Molecular Biology II</td>
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<td>1502 223</td>
<td>Biochemistry and Molecular Biology Laboratory II</td>
<td>1 (0-3-0)</td>
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<td>1502 224</td>
<td>Anatomy and Physiology I</td>
<td>4 (4-0-8)</td>
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<td>1502 225</td>
<td>Anatomy and Physiology Laboratory I</td>
<td>1 (0-3-0)</td>
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<td>1502 226</td>
<td>Anatomy and Physiology II</td>
<td>4 (4-0-8)</td>
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<td>1502 227</td>
<td>Anatomy and Physiology Laboratory II</td>
<td>1 (0-3-0)</td>
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<td>1502 230</td>
<td>Pharmaceutical Microbiology</td>
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<td>1502 231</td>
<td>Pharmaceutical Microbiology Laboratory</td>
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<tr>
<td>1502 300</td>
<td>Immunology and Biopharmaceutical Products</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1503 210</td>
<td>Pharmaceutical Botany</td>
<td>2 (2-0-4)</td>
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<td>1503 211</td>
<td>Pharmaceutical Botany Laboratory</td>
<td>1 (0-3-0)</td>
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<tr>
<td>1503 310</td>
<td>Pharmacognosy</td>
<td>3 (3-0-6)</td>
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<td>1503 311</td>
<td>Pharmacognosy Laboratory</td>
<td>1 (0-3-0)</td>
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<td>1503 220</td>
<td>Drug Chemistry</td>
<td>2 (2-0-4)</td>
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<td>1503 320</td>
<td>Fundamental of Pharmaceutical Chemistry Analysis</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1503 321</td>
<td>Pharmaceutical Chemistry Analysis</td>
<td>3 (3-0-6)</td>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
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<td>---------</td>
</tr>
<tr>
<td>1503 322</td>
<td>Pharmaceutical Chemistry Analysis Laboratory</td>
<td>1 (0-3-0)</td>
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<td>1503 323</td>
<td>Pharmaceutical Chemistry I</td>
<td>2 (2-0-4)</td>
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<td>1503 324</td>
<td>Pharmaceutical Chemistry II</td>
<td>2 (2-0-4)</td>
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<td>1504 200</td>
<td>Introduction to Pharmaceutical Technology</td>
<td>1 (1-0-2)</td>
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<td>1504 320</td>
<td>Pharmaceutical Dosage Forms I</td>
<td>4 (3-3-6)</td>
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<tr>
<td>1504 321</td>
<td>Pharmaceutical Dosage Forms II</td>
<td>4 (3-3-6)</td>
</tr>
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<td>1505 300</td>
<td>Pharmacology I</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1505 301</td>
<td>Seminar in Pharmacology I</td>
<td>1 (0-3-0)</td>
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<td>1505 302</td>
<td>Pharmacology II</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1505 303</td>
<td>Seminar in Pharmacology II</td>
<td>1 (0-3-0)</td>
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<tr>
<td>1505 400</td>
<td>Clinical Toxicology</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1506 321</td>
<td>Communication Skills and Psychology in Pharmacy Practice</td>
<td>3 (2-3-4)</td>
</tr>
<tr>
<td>1506 421</td>
<td>Hospital Pharmacy</td>
<td>2 (2-0-4)</td>
</tr>
<tr>
<td>1506 422</td>
<td>Biopharmaceutics and Pharmacokinetics</td>
<td>2 (2-0-4)</td>
</tr>
<tr>
<td>1507 300</td>
<td>Pharmaceutical Administration</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1507 400</td>
<td>Public Health Pharmacy</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1507 402</td>
<td>Community Pharmacy</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1507 403</td>
<td>Pharmacoepidemiology and Pharmacoeconomics</td>
<td>3 (3-0-6)</td>
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</table>
### 2.3 Professional Knowledge

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>1503 513</td>
<td>Herbal Medicines in Health Care System</td>
<td>1 (1-0-2)</td>
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<tr>
<td>1503 514</td>
<td>Pharmaceutical Chemistry in Clinical Practice</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1504 520</td>
<td>Pharmaceutical Technology in Pharmaceutical Care</td>
<td>3 (2-3-4)</td>
</tr>
<tr>
<td>1506 423</td>
<td>Pharmacotherapy I</td>
<td>5 (4-3-8)</td>
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<tr>
<td>1506 424</td>
<td>Pharmacotherapy II</td>
<td>5 (4-3-8)</td>
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<td>1506 514</td>
<td>Pharmacotherapy III</td>
<td>5 (4-3-8)</td>
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<td>1506 515</td>
<td>Pharmacotherapy IV</td>
<td>5 (4-3-8)</td>
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<td>1506 516</td>
<td>Drug Information Services</td>
<td>3 (1-6-2)</td>
</tr>
<tr>
<td>1506 600</td>
<td>Fundamental Professional Pharmacy Practice</td>
<td>3 (0-11-0)</td>
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<tr>
<td>1506 601</td>
<td>Pharmaceutical Care Clerkship in General Medicine</td>
<td>5 (0-16-0)</td>
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<td>1506 602</td>
<td>Pharmaceutical Care Clerkship in Ambulatory Care</td>
<td>5 (0-16-0)</td>
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<tr>
<td>1506 603</td>
<td>Pharmaceutical Care Clerkship in Community Pharmacy</td>
<td>5 (0-16-0)</td>
</tr>
<tr>
<td>1506 621</td>
<td>Pharmaceutical Care Clerkship in Medication Management for Safety</td>
<td>5 (0-16-0)</td>
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<tr>
<td>1507 515</td>
<td>Community Medicine</td>
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### 2.4 Professional Elective

Selecting 6 units from these following lists:

<table>
<thead>
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<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1502 506</td>
<td>Nutrition and Diet therapy</td>
<td>3 (2-3-4)</td>
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<tr>
<td>1502 507</td>
<td>Safety of Food and Drinking Water</td>
<td>3 (1-6-2)</td>
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<tr>
<td>1502 508</td>
<td>Application of Biotechnology in Pharmaceutical Sciences</td>
<td>3 (2-3-4)</td>
</tr>
<tr>
<td>1502 509</td>
<td>Pharmacogenetics and Pharmacogenomics</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1503 420</td>
<td>Analytical Instrumental Techniques</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>1503 515</td>
<td>Production and Quality Control of Herbal Medicines</td>
<td>3 (1-6-2)</td>
</tr>
<tr>
<td>1503 520</td>
<td>Pharmaceutical Equivalence and Bioequivalence</td>
<td>3 (2-3-4)</td>
</tr>
<tr>
<td>1504 400</td>
<td>Formulation and Development of Pharmaceutical Products</td>
<td>3 (2-3-4)</td>
</tr>
<tr>
<td>1504 522</td>
<td>Quality Control for Pharmaceutical Products</td>
<td>3 (2-3-4)</td>
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<td>1504611</td>
<td>Cosmetic Sciences</td>
<td>3 (2-3-4)</td>
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<td>1504612</td>
<td>Novel Dosage Forms and Drug Delivery Systems</td>
<td>3 (3-0-6)</td>
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<td>1504 613</td>
<td>Pharmaceutical Product Stability</td>
<td>3 (2-3-4)</td>
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<td>1505 512</td>
<td>Advances in Pharmacology</td>
<td>3 (2-3-4)</td>
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<td>1506 527</td>
<td>Special Problem in Pharmaceutical Practice</td>
<td>3 (1-6-2)</td>
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<td>1506 528</td>
<td>Aseptic Dispensary</td>
<td>3 (3-0-6)</td>
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<td>1507 521</td>
<td>Drug Marketing</td>
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<tr>
<td>1507 522</td>
<td>Quality Management and Assurance</td>
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</table>
Selecting 10 units from these following lists:

1504 600 Pharmaceutical Clerkship in Pharmaceutical Manufacturing 5 (0-16-0)
1504 601 Pharmaceutical Clerkship in Quality Assurance and Quality Control 5 (0-16-0)
1504 620 Pharmaceutical Clerkship in Cosmetics and Cosmeceuticals 5 (0-16-0)
1504 621 Pharmaceutical Clerkship in Research and Development of Pharmaceutical Products 5 (0-16-0)
1504 622 Pharmaceutical Clerkship in Animal Pharmaceuticals and Foods 5 (0-16-0)
1504 623 Pharmaceutical Clerkship in Pharmaceutical Equivalence and Bioequivalence 5 (0-16-0)
1504 624 Pharmaceutical Clerkship in Drug Registration 5 (0-16-0)
1506 604 Pharmaceutical Care Clerkship in Drug Information Services 5 (0-16-0)
1506 610 Pharmaceutical Care Clerkship in Pediatric 5 (0-16-0)
1506 611 Pharmaceutical Care Clerkship in Infectious Diseases 5 (0-16-0)
1506 612 Pharmaceutical Care Clerkship in Psychiatry 5 (0-16-0)
1506 613 Pharmaceutical Care Clerkship in Neurology 5 (0-16-0)
1506 614 Pharmaceutical Care Clerkship in Oncology 5 (0-16-0)
1506 615 Pharmaceutical Care Clerkship in Surgery 5 (0-16-0)
1506 616 Pharmaceutical Care Clerkship in Critical Care 5 (0-16-0)
1506 617 Pharmaceutical Clerkship in Drug Marketing I 5 (0-16-0)
1506 618 Pharmaceutical Clerkship in Drug Marketing II 5 (0-16-0)
1506 619 Pharmaceutical Care Clerkship in Primary Medical Care 5 (0-16-0)
1506 620 Pharmaceutical Care Clerkship in Therapeutic Drug Monitoring 5 (0-16-0)

3. Free elective 6 units
Free elective courses enable you to further extend your study into the areas which interest you.
Study Plan

First Year
(First Semester)

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<th>Code and Subject Name</th>
<th>Units</th>
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<tbody>
<tr>
<td>1104 103 Mathematics and Computer in Life</td>
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<tr>
<td>1421 102 Foundation English I</td>
<td>3 (3-0-6)</td>
</tr>
<tr>
<td>xxxx xxx Thai language</td>
<td>2-3 (x-x-x)</td>
</tr>
<tr>
<td>xxxx xxx Humanities and Social Sciences</td>
<td>3 (x-x-x)</td>
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<tr>
<td>xxxx xxx Mathematics and Sciences</td>
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<tr>
<td>1101 111 Biology I</td>
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<tr>
<td>1102 100 Chemistry I</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1102 101 Chemistry Laboratory I</td>
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(Second Semester)

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<td>1421 103 Foundation English II</td>
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<tr>
<td>xxxx xxx Humanities and Social Sciences</td>
<td>3 (x-x-x)</td>
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<tr>
<td>xxxx xxx Physical Education</td>
<td>1 (x-x-x)</td>
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<tr>
<td>1101 153 Biology II</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1102 102 Chemistry II</td>
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<td>1102 103 Chemistry Laboratory II</td>
<td>1 (0-3-0)</td>
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<tr>
<td>1104 141 Elementary Statistics</td>
<td>3 (3-0-6)</td>
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<td>1501 100 Pharmacy Orientation</td>
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<td>xxxx xxx Free elective</td>
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### Second Year
#### (First Semester)

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<tr>
<td>1102 120  Physical Chemistry</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1102 110  Organic Chemistry</td>
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<td>1 (0-3-0)</td>
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<tr>
<td>1502 220  Biochemistry and Molecular Biology I</td>
<td>3 (3-0-6)</td>
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<tr>
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</tr>
<tr>
<td>1502 224  Anatomy and Physiology I</td>
<td>4 (4-0-8)</td>
</tr>
<tr>
<td>1502 225  Anatomy and Physiology Laboratory I</td>
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#### (Second Semester)

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<tr>
<th>Code and Subject Name</th>
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<tbody>
<tr>
<td>xxx x x  Humanities and Social Sciences</td>
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<tr>
<td>1502 222  Biochemistry and Molecular Biology II</td>
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<tr>
<td>1502 223  Biochemistry and Molecular Biology Laboratory II</td>
<td>1 (0-3-0)</td>
</tr>
<tr>
<td>1502 226  Anatomy and Physiology II</td>
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<tr>
<td>1502 227  Anatomy and Physiology Laboratory II</td>
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<tr>
<td>1502 230  Pharmaceutical Microbiology</td>
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<tr>
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<td>1 (0-3-0)</td>
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<tr>
<td>1504 200  Introduction to Pharmaceutical Technology</td>
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# Third Year

## (First Semester)

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<tbody>
<tr>
<td>1421 307 English for Health Science</td>
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<tr>
<td>1502 300 Immunology and Biopharmaceutical Products</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1503 320 Fundamental to Pharmaceutical Chemistry Analysis</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1504 320 Pharmaceutical Dosage Forms I</td>
<td>4 (3-3-6)</td>
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<tr>
<td>1505 300 Pharmacology I</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1505 301 Seminar in Pharmacology I</td>
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<tr>
<td>1503 210 Pharmaceutical Botany</td>
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<td>1503 211 Pharmaceutical Botany Laboratory</td>
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<tr>
<td>1506 422 Biopharmaceutics and pharmacokinetics</td>
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## (Second Semester)

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<tbody>
<tr>
<td>1503 321 Pharmaceutical Chemistry Analysis I</td>
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<td>1504 321 Pharmaceutical Dosage Forms II</td>
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<tr>
<td>1505 302 Pharmacology II</td>
<td>3 (3-0-6)</td>
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<td>1505 303 Seminar in Pharmacology II</td>
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<tr>
<td>1503 220 Drug Chemistry</td>
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<td>1503 311 Pharmacognosy Laboratory</td>
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<td>1503 310 Pharmacognosy</td>
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## Forth Year

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<tr>
<td>1501 401 Principles of Research in Pharmacy</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1503 323 Pharmaceutical Chemistry I</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1503 513 Pharmacognosy in Health Care System</td>
<td>1 (1-0-2)</td>
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<tr>
<td>1505 400 Clinical Toxicology</td>
<td>2 (2-0-4)</td>
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<td>1506 423 Pharmacotherapy I</td>
<td>5 (4-3-8)</td>
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<tr>
<td>1506 516 Drug Information Services</td>
<td>3 (1-6-2)</td>
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<tr>
<td>1507 400 Public Health Pharmacy</td>
<td>2 (2-0-4)</td>
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<td>1507 402 Community Pharmacy</td>
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### (Second Semester)

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<tbody>
<tr>
<td>1503 324 Pharmaceutical Chemistry II</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1501 400 Pharmaceutical Jurisprudence and Professional Ethics</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1506 424 Pharmacotherapy II</td>
<td>5 (4-3-8)</td>
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<tr>
<td>1506 421 Hospital Pharmacy</td>
<td>2 (2-0-4)</td>
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<tr>
<td>1506 321 Communication Skills and Psychology in Pharmacy Practice</td>
<td>3 (2-3-4)</td>
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<tr>
<td>1507 403 Pharmacoepidemiology and Pharmacoeconomics</td>
<td>3 (3-0-6)</td>
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<tr>
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### (Summer Semester)

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<tr>
<td>1501 503 General Professional Practice</td>
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The Fifth Year
(First Semester)

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<tbody>
<tr>
<td>1503 514 Pharmaceutical Chemistry in Clinical Practice</td>
<td>3 (3-0-6)</td>
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<tr>
<td>1506 514 Pharmacotherapy III</td>
<td>5 (4-3-8)</td>
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<tr>
<td>1507 300 Pharmaceutical Administration</td>
<td>2 (2-0-4)</td>
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<tr>
<td>xxxx xxx Professional Elective</td>
<td>3 (x-x-x)</td>
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(Second Semester)

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<tr>
<th>Code and Subject Name</th>
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<tr>
<td>1504 520 Pharmaceutical Technology in Pharmaceutical care</td>
<td>3 (2-3-4)</td>
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<tr>
<td>1506 515 Pharmacotherapy IV</td>
<td>5 (4-3-8)</td>
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<tr>
<td>1506 600 Fundamental Professional Pharmacy Practice</td>
<td>3 (0-11-0)</td>
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<tr>
<td>1507 515 Community Medicine</td>
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<tr>
<td>1501 502 Senior Project</td>
<td>3 (0-9-0)</td>
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The Sixth Year
(First Semester)

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<tr>
<th>Code and Subject Name</th>
<th>Units</th>
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<tbody>
<tr>
<td>1506 601 Pharmaceutical Care Clerkship in General Medicine</td>
<td>5 (0-16-0)</td>
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<tr>
<td>1506 602 Pharmaceutical Care Clerkship in Ambulatory Care</td>
<td>5 (0-16-0)</td>
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<td>(150x xxx) Pharmaceutical Clerkship ( Elective)</td>
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(Second Semester)

<table>
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<tr>
<th>Code and Subject Name</th>
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<tbody>
<tr>
<td>1506 603 Pharmaceutical Care Clerkship in Community Pharmacy</td>
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<tr>
<td>1506 621 Pharmaceutical Care Clerkship in Medication Management for Safety</td>
<td>5 (0-16-0)</td>
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<td>(150x xxx) Pharmaceutical Clerkship ( Elective)</td>
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## Subject Details

1) General Education

### 1.1) Languages and Linguistics

<table>
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<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>1411 101</td>
<td>Thai Language and Communication</td>
<td>3 (3-0-6)</td>
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<tr>
<td></td>
<td>Thai language skills to express ideas and issues based on logical and critical thinking</td>
<td></td>
<td></td>
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<tr>
<td>1411 104</td>
<td>Thai Language Arts</td>
<td>2 (2-0-4)</td>
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</tr>
<tr>
<td></td>
<td>Skills in using the Thai language proficiently and artfully in both sending and receiving messages</td>
<td></td>
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<tr>
<td>1421 102</td>
<td>Foundation English I</td>
<td>3 (3-0-6)</td>
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<tr>
<td></td>
<td>English for communicative purposes focusing on developing listening, speaking, reading, and writing skills</td>
<td></td>
<td></td>
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<tr>
<td>1421 103</td>
<td>Foundation English II</td>
<td>3 (3-0-6)</td>
<td>1421 102</td>
<td></td>
</tr>
<tr>
<td></td>
<td>English for communicative purposes at a higher level; focusing on listening; speaking; reading; and writing skills</td>
<td></td>
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<tr>
<td>1421 208</td>
<td>Academic English</td>
<td>3 (3-0-6)</td>
<td>1421 103</td>
<td></td>
</tr>
<tr>
<td></td>
<td>English for communication in academic contexts focusing on academic reading and summarizing in both written and oral forms</td>
<td></td>
<td></td>
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<tr>
<td>1421 307</td>
<td>English for Health Science</td>
<td>3 (3-0-6)</td>
<td>1421 208</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Academic English in health sciences contexts with an emphasis on reading for analyzing, discussing key issues and presenting academic opinions</td>
<td></td>
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</table>
1.2) Mathematics and Sciences

1101 141 Sciences in Daily Life 3 (3-0-6)

Pre: -
Co: -

Development of science; scientific concepts about nature, philosophy, scientific methodology; science process skill, facts about nature as related to humans and other living things; conservation of natural resources; scientific and technological innovation in daily life

1101 146 Biodiversity and Climate Change 3 (3-0-6)

Pre: -
Co: -

Causes and present evidence of climate change effecting on local, regional and global biodiversity including terrestrial, fresh water and marine ecosystems; biological extinction and mutation; epidemic; emerging diseases; effects on food and agricultural products; solving approaches at personal, local and international levels

1101 147 Environment and Life 3 (3-0-6)

Pre: -
Co: -

Integrated relationship between disciplines in environmental science; current understandings and conceptual frameworks in the study of environment and human life; informational resources about environment; relationship between human, society and environment; importance of ecosystems; natural resources; and biodiversity; current status of natural resources consumption; impact of technology on environment; scientific approaches to management of environmental problems; sustainable development; environmental laws; roles of youth in environmental management

1101 148 Life and Microorganisms 3 (3-0-6)

Pre: -
Co: -

Basic knowledge about microorganisms in human daily life; microorganic types and processes; positive and negative impacts of microorganisms on environment; pathogenic microbes and their relations to human health and life; utilization of microorganisms in waste treatment for better quality of human life
1102 109 Physical Sciences in Daily Life

Pre  : -
Co   : -

Chemistry in daily life contexts; prevention of threats of acid rain; chemistry of global warming; protection of the ozone layers; food products and their labels; world of polymers and plastics; prevention and management of common hazardous wastes; force and motion of objects; energy and livelihood; electricity usage and safety; mechanic wave of Tsunami; celestial phenomena

1103 128 Household Electrical Appliances in Daily Life

Pre  : -
Co   : -

Electrical sources; basic principles of electricity and electric circuits and their applications for safety and cost reduction; common household appliances for daily use; highly efficient energy saving appliances

1104 113 Mathematics and Computers in Daily Life

Pre  : -
Co   : -

Classification of mathematics; number and symbol; mathematical structure; mathematical reasoning; problem solving using mathematical methods; mathematics and other sciences; statistics in daily life; how the computer work; using computer in workplace; efficiently use of the internet

1200 108 Food for Life

Pre  : -
Co   : -

Five groups of food staples and water; agricultural sectors and food production; foods and their benefits; age-appropriated nutrition; basic knowledge on health assessment; food safety and their selection; herbs in food and their health benefits; phytochemicals for good health; household food production; commercial advertising and decision on food product consumption
1.3) Humanities and Social Sciences

1432 110 Man and Reasoning 3 (3-0-6)
- Pre : -
- Co : -
- Relationship between man and reason; characteristics and patterns of reasoning; assessment of reasoning; logical fallacies; critical reading of articles

1431 102 Philosophy in Life and Society 3 (3-0-6)
- Pre : -
- Co : -
- Definition, characteristics, and scope of Western and Eastern philosophies; important issues in metaphysics, epistemology, ethics and aesthetics; different religious perspectives on Thai philosophy

1431 101 Man and Aesthetics 3 (3-0-6)
- Pre : -
- Co : -
- Aesthetics of nature; aesthetics of fine art; man-made aesthetics and ugliness in human society and natural surroundings; subjectivist, objectivist and relativist analyses of aesthetics; conceptual overview of aesthetics

1432 101 Thai Culture 3 (3-0-6)
- Pre : -
- Co : -
- Development of Thai society and culture; analytical tools from the Thai intellectual heritage; selected topics of interest related to alternative solutions amidst social, economic, and cultural changes

1438 100 Arts for Emotional Refinement 3 (3-0-6)
- Pre : -
- Co : -
- General backgrounds and aspects of arts in various forms including artistic artifacts and dynamic arts encouraging emotional refinement; use of arts in creative self-expression lending to emotional refinement; social intelligence and intellectual improvement quality of life which form spiritual uplift and aesthetics
1435 100 Music and Life  
Pre : -  
Co : -  
Elements of music; relationships between music and human life; purposes and roles of music in human lifestyles and society

1441 100 Man and Society  
Pre : -  
Co : -  
Dimensions of social sciences and science; sociology; nationalism; consumerism and globalization; class; gender; status; Thai political problems

1442 100 Contemporary Culture  
Pre : -  
Co : -  
Cultural concepts; analysis of contemporary cultural phenomena; cultural structures and powers in Thai society and global society; analysis of cultural relationships concerning issues such as globalization, nation state, ethnicity, religious beliefs and gender

1443 200 Law and Society  
Pre : -  
Co : -  
Concepts, theories, roles, functions, and types of laws; legal organizations; lawmaking; law and social control; law and social change; law enforcement

1445 100 Dynamics of Thai Society  
Pre : -  
Co : -  
Concepts, development, and relationships between Thailand’s economy, politics and society with respect to capitalist transformation; development towards democracy; Thai nationalism; ideologies and social factions

1446 101 Art of Living  
Pre : -  
Co : -  
Man and thinking; understanding of self and others; roles; duties and responsibilities in family and society; teamwork, personality and social etiquettes; interpersonal relationships and communication
1447 200 Man and Communication 3 (3-0-6)

Pre  : -
Co   : -

Importance and need for communication; processes, elements, and forms of human communication with an emphasis on functions and roles of communication in modern society; search and utilization of information for communicative purposes.

1708 200 Buddhist Economics and Sufficiency Economy 3 (3-0-6)

Pre  : -
Co   : -

Importance of Buddhist Economics; comparison between Buddhist Economics and mainstream economics; understanding of human beings context through Buddhism; consumption; production and product distribution in Buddhist Economics context and government’s roles; sufficiency economy and sustainable development.

1700 100 Modern Business Management 3 (3-0-6)

Pre  : -
Co   : -

Science of management; concepts, theories and practice in economics; organization management; human resources management; marketing; efficiency and effectiveness improvement; finance; accounting; taxation; international business; risk management; application for business analysis and decision making.

1703 110 Finance Skills in Daily Life 3 (3-0-6)

Pre  : -
Co   : -

Management of daily life personal finance; personal financial planning process; financial planning for retirement with an emphasis on developing the quality of personal life in both mental and physical aspects.
1.4) Physical Education

1439 100 Exercise for Health 1 (0-2-1)
Pre : -
Co : -
Benefits, steps, and cautions concerning different types of exercises; self-efficacy assessment

1439 101 Sports for Health 1 (0-2-1)
Pre : -
Co : -
Different types of sports in terms of basic skills, rules and regulations, playing instructions and competitions
2) Core curriculum

2.1) Basic Knowledge

1101 111 Biology I 3 (3-0-6)
Pre : -
Co : -
Basic concepts in biology, origin and nature of life, chemistry of life, cell biology, cell cycle and life cycle of organisms, perpetuation of life, evolution and diversity of organisms.

1101 153 Chemistry Biology II 3 (3-0-6)
Pre : 1101 111 Biology I
Co : -
Plant morphology and anatomy, plant function, animal tissue, animal structure and function, animal organ system, animal behavior and social animal, interaction between organism and environment

1102 100 Chemistry I 3 (3-0-6)
Pre : -
Co : 1102 101 Chemistry Laboratory I
Introduction; stoichiometry; atomic structures; periodic table; chemical bonding; gases; liquids and solutions; solids; chemical kinetics; thermodynamics

1102 101 Chemistry Laboratory I 1 (0-3-0)
Pre : -
Co : 1102 100 Chemistry I หรือ 1102 106 Chemistry for Science Students I
Chemicals; glass-wares and equipment in chemistry laboratory; error from basic equipment; stoichiometry; chemical bonding; molar volume of oxygen; crystal structure; colligative properties of solution; thermodynamic chemistry; kinetics; chemical equilibrium

1102 102 Chemistry II 3 (3-0-6)
Pre : 1102 100 Chemistry I
Co : -
Chemical equilibrium; Acid-base equilibrium; Electrochemistry; Chemistry of representative and transition elements; Coordination compounds; Nuclear chemistry; Organic chemistry and biochemistry; Environmental chemistry
1102 103 Chemistry Laboratory II 1 (0-3-0)
Pre : 1102 101 Chemistry Laboratory I
Co : 1101 102 Chemistry II หรือ 1102 107 Chemistry for Science Students II
Preparation of acid-base solution and standardized; titration of acid-base; chromatography; electrochemistry and corrosion; qualitative anion analysis; qualitative cation analysis column I; II and III; redox titration; identification of functional group of organic compounds

1102 110 Organic Chemistry 3 (3-0-6)
Pre : 1102 102 Chemistry II
Co : -
Structure; chemical bonding; physical property; acidity-basicity; stereochemistry and reaction of hydrocarbons; alkyl halides; alcohols; phenol; ethers; aldehydes; ketones; carboxylic acids and derivatives of carboxylic acids; amines; biomolecules

1102 111 Organic Chemistry Laboratory 1 (0-3-0)
Pre : -
Co : 1102 112 Organic Chemistry for Science Students
Basic techniques in chemical separation; purification and testing of the chemical properties of organic molecules

1102 120 Physical Chemistry 3 (3-0-6)
Pre : 1102 102 Chemistry II หรือ 1102 104 General Chemistry
Co : -
Ideal and real gas behavior; thermodynamics state function, 0\textsuperscript{th}, 1\textsuperscript{st}, 2\textsuperscript{nd} and 3\textsuperscript{rd} law of thermodynamics; Gibb’s free energy; thermodynamics and equilibrium; phase equilibrium; chemical kinetics; reaction order determination; reaction mechanism; dependence of rate on various factors; theories of chemical reactions; introduction of electrochemistry; theories of electrolyte; potential of membrane; electrode and electrochemical cell; thermodynamics of reversible galvanic cell and the application of electromotive cell

1104 141 Elementary Statistics 3 (3-0-6)
Pre : -
Co : -
Meaning and purpose of statistics; measuring statistical trends; measuring distribution; probability of random variables; various types of distributions; estimating and
testing hypothesis; nonparametric statistics; simple regressions and correlation; basic variable; experimental planning

2.2) Core course

1501 100 Pharmacy Orientation 1 (1-0-2)
  Pre : -
  Co : -
  Introduction to pharmacy profession; history and evolution of pharmacy profession; pharmaceutical related organizations in both government and private sectors, duties and roles of pharmacists in public health and related fields; development of attitudes and concepts towards pharmacy profession

1501 400 Pharmaceutical Jurisprudence and Professional Ethics 2 (2-0-4)
  Pre : -
  Co : -
  Morals; professional ethics of pharmacy profession; laws; regulations; standards of professional practice, professional and social responsibilities

1501 401 Principles of Research in Pharmacy 3 (3-0-6)
  Pre : 1104 141 Elementary Statistics
  Co : -
  Set up appropriate research questions; hypothesize related to research questions; systematic literature review; select appropriate research methodology; formulate questionnaires and testing; determination of population and sample, sample selection; data analysis and interpretation; research proposal writing and result reporting

1501 502 Senior Project 3 (0-9-0)
  Pre : 1501 401 Principles of Research in Pharmacy
  Co : -
  Integration of scientific and social knowledge; elementary research in a certain topic/field, e.g. pharmaceutical care, pharmaceutical administration, primary health care system, public drug consumption, medicinal plants, pharmacognosy, pharmaceutical technology, drug quality assurance
1501 503 General Professional Practice 6 (0-27-0)
Pre : 1505 302 Pharmacology II
1506 421 Hospital Pharmacy
1507 402 Community Pharmacy
Co : -
Professional practice in hospital and community pharmacy regarding Pharmacy Council criteria

1502 220 Biochemistry and Molecular Biology I 3 (3-0-6)
Pre : 1101 153 Biology II
1102 110 Organic Chemistry
Co : 1502 221 Biochemistry and Molecular Biology Laboratory I
Study biochemistry and molecular biology in cell and chemical compositions; biological buffers; structures and properties of carbohydrates; amino acids and proteins; lipids and nucleic acids; enzymes; vitamins and coenzymes; introduction to metabolism and metabolism of carbohydrates; protein and amino acid; lipids and nucleic acids; integration of metabolism, energy metabolism, control of metabolism; biochemical aspect of hormones; porphyrins; related compounds and blood and nutrition

1502 221 Biochemistry and Molecular Biology Laboratory I 1 (0-3-0)
Pre : -
Co : 1502 220 Biochemistry and Molecular Biology I
Laboratory in basic biochemistry and molecular biology techniques designed to be taken in conjunction with Biochemistry and Molecular Biology I

1502 222 Biochemistry and Molecular Biology II 3 (3-0-6)
Pre : 1502 220 Biochemistry and Molecular Biology I
Co : 1502 223 Biochemistry and Molecular Biology Laboratory II
Special biochemical pathways of tissues; metabolic disorders; Clinical Laboratory of blood and urine; cell cycle; cell division and apoptosis; flow of genetic information; regulation of gene expression; biochemical genetic; classical genetics; chromosome; pattern of inheritance; population genetics; genetic disorders, gene therapy, genetic counseling; cancer genetics; fundamental molecular biology in medicine
1502 223 Biochemistry and Molecular Biology Laboratory II  1 (0-3-0)
  Pre  : 1502 221 Biochemistry and Molecular Biology Laboratory I
  Co   : 1502 222 Biochemistry and Molecular Biology II
  Laboratory in basic biochemistry and molecular biology techniques designed to be taken in conjunction with Biochemistry and Molecular Biology II

1502 224 Anatomy and Physiology I  4 (4-0-8)
  Pre  : 1101 153 Biology II
  Co   : 1502 225 Anatomy and Physiology Laboratory I
  Introduction to human anatomy and physiology; cell structures and functions; tissues; tissue adaptation and injury; alterations in cell growth and replication; carcinogenesis; human anatomy, physiology, and pathophysiology of nervous; musculoskeletal; and endocrine systems

1502 225 Anatomy and Physiology Laboratory I  1 (0-3-0)
  Pre  : -
  Co   : 1502 224 Anatomy and Physiology I
  Laboratory of gross anatomy, microanatomy, and physiology of human basic structures; cells and tissues; nervous system; musculoskeletal system; and endocrine system

1502 226 Anatomy and Physiology II  4 (4-0-8)
  Pre  : 1502 224 Anatomy and Physiology I
  Co   : 1502 227 Anatomy and Physiology Laboratory II
  Blood and blood components; blood disorders; human anatomy, physiology, and pathophysiology of cardiovascular; respiratory; gastrointestinal; reproductive; and urinary systems; fluid; electrolytes; and acid-base balance

1502 227 Anatomy and Physiology Laboratory II  1 (0-3-0)
  Pre  : 1502 225 Anatomy and Physiology Laboratory I
  Co   : 1502 226 Anatomy and Physiology II
  Laboratory of gross anatomy, microanatomy, and physiology of cardiovascular; respiratory; urinary; gastrointestinal; and reproductive systems
1502 230 Pharmaceutical Microbiology  
Pre : 1502 220 Biochemistry and Molecular Biology I  
Co : 1502 231 Pharmaceutical Microbiology Laboratory  
Characteristics of human pathogenic microorganisms of bacteria; fungi; viruses; parasites; pathogenicity of these microorganisms; control and prophylaxis of infectious diseases; methods of sterilization; identification of microorganisms; sensitivity to antimicrobial drugs; applications of pharmaceutical microbiology in pharmaceutical technology

1502 231 Pharmaceutical Microbiology Laboratory  
Pre : -  
Co : 1502 230 Pharmaceutical Microbiology  
Laboratory in basic techniques of microbiology; microorganisms in the environment; pure culture techniques; isolation and identification techniques; biochemical assays of bacteria; sterilization techniques; antimicrobial sensitivity test; microbiological assays for pharmaceutical products; microbiological products

1502 300 Immunology and Biopharmaceutical Products  
Pre : 1502 230 Pharmaceutical Microbiology  
Co : -  
Introduction to human immune system; functions; components; cells and organs of the immune system; mechanism of immune responses; assays for antigen-antibody reactions; immunopathology, immunization; biopharmaceutical products, vaccines, sera, toxoids, allergens, antivenins, and others; laws and regulations related to the uses and storage of biopharmaceutical products; development and applications of biopharmaceutical products

1503 210 Pharmaceutical Botany  
Pre : 1101 153 Biology II  
Co : 1503 211 Pharmaceutical Botany Laboratory  
Cell and tissue anatomy; morphology; basic taxonomy; and pharmaceutical uses of medicinal plants; fungi; algae; and ferns
1503 211 Pharmaceutical Botany Laboratory 1 (0-3-0)
  Pre  : -
  Co   : 1503 210 Pharmaceutical Botany
  Laboratory techniques for anatomical and morphological studies of medicinal plants and their parts; taxonomic classification of plants using organoleptic and microscopic techniques

1503 310 Pharmacognosy 3 (3-0-6)
  Pre  : 1503 210 Pharmaceutical Botany
  Co   : 1503 311 Pharmacognosy Laboratory
  Biosynthesis pathways; sources of primary and secondary natural metabolites according to their chemical structures; phytochemical screening, extraction, isolation; and identification of natural compounds

1503 311 Pharmacognosy Laboratory 1 (0-3-0)
  Pre  : 1503 211 Pharmaceutical Botany Laboratory
  Co   : 1503 310 Pharmacognosy
  Extraction; quality analysis; identification of groups of natural product compounds with laboratory techniques and quality control of herbal raw materials and finished products

1503 220 Drug Chemistry 3 (3-0-6)
  Pre  : 1102 110 Organic Chemistry
  Co   : -
  Principle of drug discovery and development processes; modifications of chemical structures to enhance pharmacological activity; drug-target interactions; structure-activity relationship; physicochemical properties of a drug and its relationships with pharmacological activities and pharmacokinetic properties

1503 320 Fundamentals to Pharmaceutical Chemistry Analysis 2 (2-0-4)
  Pre  : 1102 102 Chemistry II
  Co   : -
  Pharmacopoeias; basic statistics for analytical chemistry; significant figures; glasswares, glassware calibration; balances; basic analytical instruments in laboratory; gravimetric analysis; electrochemistry; water content analysis
1503 321 Pharmaceutical Chemistry Analysis     3 (3-0-6)
  Pre   : 1503 320 Fundamental of Pharmaceutical Chemistry Analysis
  Co    : 1503 322 Pharmaceutical Chemistry Analysis Laboratory
  Quantitative analysis by acid-base titration; complexometric titration; precipitation titration; non-aqueous titration; redox titration; qualitative and quantitative analyses using chromatography (TLC and HPLC) and spectrophotometry (UV-VIS and fluorospectrometry); development of analytical method for raw materials and pharmaceutical products; method validation; applications of analytical techniques

1503 322 Pharmaceutical Chemistry Analysis Laboratory     1 (0-3-0)
  Pre   : 1102 103 Chemistry Laboratory II
  Co    : 1503 321 Pharmaceutical Chemistry Analysis I
  Laboratory safety; qualitative and quantitative analyses; acid-base titration; complexometric titration; precipitation titration; redox titration; analysis using spectrophotometric and chromatographic techniques; development of analytical method for raw materials and pharmaceutical products

1503 323 Pharmaceutical Chemistry I     2 (2-0-4)
  Pre   : 1503 220 Drug Chemistry
  Co    : -
  Chemical structure and pharmacological activity relationship of drugs according to systemic pharmacological classifications of autacoids; general and local anesthetics; central nervous; autonomic nervous; gastrointestinal; and cardiovascular systems

1503 324 Pharmaceutical Chemistry II     2 (2-0-4)
  Pre   : 1503 220 Drug Chemistry
  Co    : -
  Chemical structure and pharmacological activity relationship of opioid analgesics; cerebroactive drugs; non-steroidal anti-inflammatory drugs; drugs used in gout and arthritis; drugs used in infectious diseases; drugs affecting respiratory; endocrine; and reproductive systems

1504 200 Introduction to Pharmaceutical Technology     1 (1-0-2)
  Pre   : -
  Co    : -
  Introduction to pharmaceutical dosage forms; pharmacopoeia; pharmaceutical references; Latin in prescriptions; pharmaceutical calculations; basic compounding techniques
1504 320 Pharmaceutical Dosage Forms I 4 (3-3-6)
Pre : 1504 200 Introduction to Pharmaceutical Technology
Co : -
Introduction to pharmaceutical formulation; physicochemical principles of solutions; ionic equilibrium; buffer and isotonic solutions; solubilization techniques; interfacial phenomena; dispersion systems; rheology and viscosity; pharmaceutical stability; fundamentals and basic techniques of pharmaceutical formulation; pharmaceutical excipients; pharmaceutical compounding of various preparations: solutions, suspension, and semisolid

1504 321 Pharmaceutical Dosage Forms II 4 (3-3-6)
Pre : 1504 320 Pharmaceutical Dosage Forms I
Co : -
State of matters; physicochemical properties of solids; micromeritics; manufacturing process and quality control of pharmaceutical solid and sterile dosage forms; Good Manufacturing Practice; quality assurance for pharmaceutical products; drug delivery systems

1505 300 Pharmacology I 3 (3-0-6)
Pre : 1502 226 Anatomy and Physiology II
Co : 1505 301 Pharmacology I
General principles of pharmacology; pharmacodynamics; pharmacokinetics; systemic pharmacology: autacoids; general and local anesthetics; central nervous; autonomic nervous; gastrointestinal; and cardiovascular systems

1505 301 Pharmacology I 1 (0-3-0)
Pre : -
Co : 1505 300 Pharmacology I
Searching for pharmacological information, seminar topics related to the contents in Pharmacology I

1505 302 Pharmacology II 3 (3-0-6)
Pre : 1505 300 Pharmacology I
Co : 1505 303 Seminar in Pharmacology II
Opioid analgesics; Cerebroactive drugs; non-steroidal anti-inflammatory drugs; drugs used in gout and arthritis; drugs used in infectious diseases; drugs affecting respiratory, endocrine, and reproductive systems
1505 303 Seminar in Pharmacology II
   Pre   : 1505 301 Pharmacology I
   Co    : 1505 302 Pharmacology II
   Searching for pharmacological information, seminar topics related to the contents in Pharmacology II

1505 400 Clinical Toxicology
   Pre   : 1505 302 Pharmacology II
   Co    : -
   Classification; sources; physicochemical properties of toxic substances found in agriculture, foods and cosmetics, and environment; effects on health; toxicity of substance abuse; drug overdose; mechanisms, signs and symptoms of toxicity, emergency diagnosis, treatment, antidotes, prevention of toxic poisoning

1506 321 Communication skills and Psychology in Pharmacy Practice
   Pre   : -
   Co    : -
   Importance of psychology and pharmaceutical care; theories of health behavior; factors associated with health behavior; personal factors related to practice, personality, and working behaviors; psychology and communication skills, implementation of communication skill, and communication with patients in English

1506 421 Hospital Pharmacy
   Pre   : -
   Co    : -
   Correlation of public policy in public health; hospital management in pharmacy services; pharmaceutical inventory management; pharmaceutical distribution system; academic services; budget management; finance; roles of the Pharmacy and Therapeutic Committee; hospital accreditation

1506 422 Biopharmaceutics and Pharmacokinetics
   Pre   : 1502 226 Anatomy and Physiology II
   Co    : -
   Physical property of drugs; dosage forms; routes of administration; drug absorption; distribution; metabolism; and elimination; drug compartmentalization; mathematic and statistical calculations; linear and non-linear pharmacokinetics; influence of
hepatic drug clearance; basic bioavailability and bioequivalence; applications of clinical pharmacokinetic

1507 300 Pharmaceutical Administration 2 (2-0-4)
  Pre : -
  Co : -
  Basic principles of management; planning; organizing; staffing; leading; controlling; organization behaviors; human resource management; pharmacy service evaluation

1507 400 Public Health Pharmacy 2 (2-0-4)
  Pre : -
  Co : -
  Concepts in health and public health; structure; principle of public health; health care system; health care reform and health care service in Thailand, national public health problems; pharmacist’s role in health care system; epidemiology and economical issue in public health

1507 402 Community Pharmacy 2 (2-0-4)
  Pre : -
  Co : -
  Principles; concepts of community pharmacy practices; community pharmacy opening; accredited community pharmacy; small business management; location analysis; sources of funding; accounting; financial management; inventory management; merchandising; pharmaceutical care services for patients and community; community health promotion

1507 403 Pharmacoepidemiology and Pharmacoeconomics 3 (3-0-6)
  Pre : 1104 141 Elementary Statistics
  Co : -
  Introduction to pharmacoepidemiology; study designs; drug distribution; effect of drug use in population; quality of life measurement; drug use surveillance system; principles of health economics; cost analysis; tools in pharmacoeconomics
2.3) Professional Knowledge

1503 513 Herbal medicines in Health Care System 1 (1-0-2)
  Pre   : 1503 310 Pharmacognosy
  Co    : -
  Uses of herbal medicines in primary health care, hospitals; alternative medicines; some important herb-drug interactions; herbal information searching; laws and regulations related to herbal medicines

1503 514 Pharmaceutical Chemistry in Clinical Practice 3 (3-0-6)
  Pre   : 1503 323 Pharmaceutical Chemistry I
         หรือ 1503 324 Pharmaceutical Chemistry II
  Co    : -
  Relationship between chemical structure of active compound and stability; unwanted pharmacological activities which arise from chemical structure characteristics of drugs; comparing and choosing drugs from their chemical structure characteristics and pharmacological activity

1504 520 Pharmaceutical Technology in Pharmaceutical Care 3 (2-3-4)
  Pre   : 1504 321 Pharmaceutical Dosage Forms II
  Co    : -
  Compounding of extemporaneous preparations; cytotoxic preparations; Total Parenteral Nutrition; stability and incompatibility of pharmaceutical products and IV admixtures; special pharmaceutical products; pharmaceutical packaging and storage; compounding of pharmaceutical products used in hospital

1506 423 Pharmacotherapy I 5 (4-3-8)
  Pre   : 1505 300 Pharmacology I
  Co    : -
  Pathology of diseases, diagnosis, drugs used in various diseases; respiratory system; gastrointestinal system; urinary system; fluid and electrolyte imbalance; drug uses in special populations; children, elderly, women in pregnant or lactation stages; appropriate drug uses in individual patients, patient counseling, monitoring of therapeutic effects, adverse reactions, and drug interactions; applications of pharmacokinetics principle for dosage adjustment; monitoring of drugs with narrow therapeutic index
1506 424 Pharmacotherapy II       5 (4-3-8)
   Pre  : 1505 302 Pharmacology II
   Co   : -
Pathology of disease, diagnosis, drug used in various diseases; endocrine system; cardiovascular system; bone and skeletal muscle; birth control; dermatological diseases; appropriate drug uses in individual patients, patient counseling, monitoring of therapeutic effects, adverse reactions, and drug interactions; applications of pharmacokinetics principle for dosage adjustment; monitoring of drugs with narrow therapeutic index

1506 514 Pharmacotherapy III       5 (4-3-8)
   Pre  : 1505 302 Pharmacology II
   Co   : -
Pathology of diseases, diagnosis, drugs used in infectious diseases; bacteria; virus; fungal; protozoa; parasites; appropriate drug uses in individual patients, patient counseling, monitoring of therapeutic effects, adverse reactions, and drug interactions; applications of pharmacokinetics principle for dosage adjustment; monitoring of drugs with narrow therapeutic index

1506 515 Pharmacotherapy IV       5 (4-3-8)
   Pre  : 1505 302 Pharmacology II
   Co   : -
Pathology of disease, diagnosis, drug used in various diseases; mental and psychiatric disorders; cancer; hematological disorders; total parenteral nutrition in malnutrition patients; immunological disorders; first aids; appropriate drug uses in individual patients, patient counseling, monitoring of therapeutic effects, adverse reactions, and drug interactions; applications of pharmacokinetics principle for dosage adjustment; monitoring of drugs with narrow therapeutic index

1506 516 Drug Information Services       3 (1-6-2)
   Pre  : -
   Co   : -
Establishing of drug information service; drug information resources; pharmacists’ role in drug information service; systematic approach for drug information enquiries; pharmaceutical literature evaluation; preparation of drug information in correspondence to the inquiry; communication skills for customer consultation
1506 600  Fundamental Professional Pharmacy Practice    3 (0-11-0)
  Pre   : 1501 503 General Professional Practice
          1506 423 Pharmacotherapy I
          1506 424 Pharmacotherapy II
          1506 514 Pharmacotherapy III
  Co    : -
  The basic professional pharmacy clerkship mainly object to making the familiarity
  of the pharmaceutical care service with health care professional, and to practice the
  communication skill in getting the patient’s information and counseling, documentation in
  pharmaceutical care service, presentation of case study and academic in-service, with an
  application of pharmaceutical care knowledge for each patient care

1506 601 Pharmaceutical Care Clerkship in General Medicine    5 (0-16-0)
  Pre   : 1506 600 Fundamental Professional Pharmacy Practice
  Co    : -
  Pharmaceutical care for patients in General Medicine Unit; working in a
  multidisciplinary team for patient care; therapeutic planning and monitoring; patient
  counseling; practicing of communication skill; health care provider and patient relationship
  establishment

1506 602 Pharmaceutical Care Clerkship in Ambulatory Care    5 (0-16-0)
  Pre   : 1506 600 Fundamental Professional Pharmacy Practice
  Co    : -
  Pharmaceutical care for patients in out-patients; working in a multidisciplinary
  team for patient care; therapeutic planning and monitoring; patient counseling; practicing of
  communication skill; health care provider and patient relationship establishment

1506 603 Pharmaceutical Care Clerkship in Community Pharmacy    5 (0-16-0)
  Pre   : 1506 600 Fundamental Professional Pharmacy Practice
  Co    : -
  Pharmaceutical care practice in community pharmacy; patient care; drug selection;
  monitoring of drug use; patient counseling; patient transfer in selected cases; screening for
  hypertension and diabetes mellitus, smoking cessation, health promotion
1506 621 Pharmaceutical Care Clerkship in Medication Management for Safety
5(0-16-0)
Pre : 1506 600 Fundamental Professional Pharmacy Practice
Co : -
Medication management; safety and rational use of drug; drug availability; prevention of medication error; good information system; drug therapy problem, risk, medication error, adverse drug events analysis; continuing improvement of information system in each health organization

1507 515 Community Medicine
2 (1-3-2)
Pre : 1507 400 Public Health Pharmacy
Co : -
Identification of public health problems in community; development of analytical thinking and problem-solving skills from real situations; systematic approach in community research; activity planning, problem-solving and prevention with community participation

2.4) Professional Elective
1502 506 Nutrition and Diet therapy
3 (2-3-4)
Pre : 1502 222 Biochemistry and Molecular Biology II
Co : -
Definition and significance of nutrition; essential foods and nutrients; energy requirements; nutritional problems; nutritional assessments; familial dietetics; concepts in diet therapy; food exchanges; hospital housed diet; diet therapy for patients suffering from diabetes mellitus, liver disease, kidney disease, gout, gastrointestinal disorders, burns and fever

1502 507 Safety of Food and Drinking Water
3 (1-6-2)
Pre : -
Co : -
Food components; contaminants in food; drinking water and containers; standards for quality control of food and drinking water; the related methods of analysis; toxicological tests; rules and regulation for consumer protection

1502 508 Application of Biotechnology in Pharmaceutical Sciences
3 (2-3-4)
Pre : 1502 222 Biochemistry and Molecular Biology II
Co : -
Introduction to concepts and techniques in biotechnology; genomic; proteomic and additional biotechnology-related technology; drug delivery system for biomacromolecules; monoclonal antibodies, cytokines, clotting factors and enzyme and
regulators of enzymatic activity as therapeutic drugs, oligonucleotides and gene therapy; applied biotechnology in vaccine development; pharmacogenomic approach in the therapeutics

1502 509 Pharmacogenetics and Pharmacogenomics 3 (3-0-6)

Pre : 1506 422 Biopharmaceutics and Pharmacokinetiks
Co : -

Definition and history of pharmacogenetics/pharmacogenomics; drug discovery and development; pharmacodynamics; pharmacokinetics and drug metabolisms; gene regulation and gene expression; population genetics; human variation; biomolecular techniques; genotyping; bioinformatics and databases; biostatistics; linkage and genome wide association study; ethical issues in pharmacogenetics/pharmacogenomics; personalized medicine and application; discussion on papers related to pharmacogenetics/pharmacogenomics such as adverse drug interactions and pharmacogenetics, cancer pharmacogenetics, cardiovascular genetics and psychiatric pharmacogenetics

1503 420 Analytical Instrumental Techniques 3 (3-0-6)

Pre : 1503 321 Pharmaceutical Chemistry Analysis I
Co : -

Principles and techniques in analytical instruments e.g. UV-visible spectrophotometer; Atomic spectrophotometer; Polarimeter; Refractometer; High performance liquid chromatography; Gas chromatography; principles and techniques in structural elucidation and identification using spectrometry e.g. Mass spectrometry; UV-visible spectrophotometry; Infrared spectrophotometry; and Nuclear magnetic spectrophotometry; method validation; statistics in pharmaceutical analysis

1503 515 Production and Quality Control of Herbal Medicines 3 (1-6-2)

Pre : 1503 310 Pharmacognosy
Co : -

Type, regulations and registration of herbal medicines; current situation of herbal medicines; Good Manufacturing Process of herbal medicines; quality control of raw materials and finished products; tests following pharmacopoeia criteria
1503 520 Pharmaceutical Equivalence and Bioequivalence 3 (2-3-4)

Pre : 1506 422 Biopharmaceutics and Pharmacokinetics
Co : -

Principles and techniques, bioequivalence study; standard good clinical practice; procedure and study of pharmaceutical equivalence and bioequivalence; study of pharmacology; toxicology and pharmacokinetic of drugs; assay development and validation of drug from pharmaceutical dosage form and biological fluid; study design; protocol writing complied with standard good clinical practice; evaluation of pharmaceutical equivalence and bioequivalence for preparing drug specification

1504 400 Formulation and Development of Pharmaceutical Products 3 (2-3-4)

Pre : 1504 321 Pharmaceutical Dosage Forms II
Co : -

Preformulation studies; formulation guidelines and compounding techniques; application of pharmaceutical formulation for liquid, semi-solid, and solid dosage forms development; application of physicochemical principles for product stability estimation

1504 522 Quality Control for Pharmaceutical Products 3 (2-3-4)

Pre : 1504 321 Pharmaceutical Dosage Forms II
Co : -

Operation planning for quality control and assurance of raw materials; in-process and finished pharmaceutical products; method validation of pharmaceutical production processes and analytical methods; stability testing of active pharmaceutical ingredients and finished pharmaceutical products; principles and conceptual aspects of quality assurance in pharmaceutical products; national and international standards; agreements and regulations at national and international forums

1504 611 Cosmetic Sciences 3 (2-3-4)

Pre : 1504 321 Pharmaceutical Dosage Forms II
Co : -

Definition; classification; regulations and cosmetic legislation; principles of cosmetic selection; principles of raw material selection; product design and production procedures for skin, hair and oral care products; technology of cosmetic color sciences and fragrances; quality control and assurance; products evaluation; novel technology in cosmetic formulation; packaging designs; product marketing and advertising
1504 612 Novel Dosage Forms and Drug Delivery Systems 3 (3-0-6)
Pre : 1504 321 Pharmaceutical Dosage Forms II
Co : -
Controlled drug release techniques; coating active ingredients with low water soluble carrier; changing physical property of the active compounds in order to have suitable water solubility; application of lipids and pharmaceutical non-biodegradable and biodegradable polymers; types and mechanisms of drug release of immediate release and sustained release systems

1504 613 Pharmaceutical Product Stability 3 (2-3-4)
Pre : 1504 321 Pharmaceutical Dosage Forms II
Co : -
Drug degradation theories; principles of stability testing; accelerated and long-term stability testing design; shelf-life estimation and suitable storage conditions of pharmaceutical products

1505 512 Advances in Pharmacology 3 (2-3-4)
Pre : 1505 302 Pharmacology II
Co : -
Introduction to new drugs; information resources of new drugs; evaluation of information resources; basic and clinical evaluation of new drugs; drug utilization evaluation; advances in pharmacology of anti-inflammatory drugs; drugs used in infectious diseases; cancer; immunomodulators; and drugs affecting the respiratory; gastrointestinal; endocrine; reproductive; cardiovascular and nervous systems

1506 527 Special Problem in Pharmacy Practice 3 (1-6-2)
Pre : -
Co : -
Identify and appropriately formulate research question related to pharmacy practice; particularly in regular pharmacy services; search and review related literatures; tools and methods validated or develop a new tool or method to solve the problem; select research method appropriately; planning data collection; analysis; presentation of the results
1506 528 Aseptic Dispensary 3 (3-0-6)
   Pre : 1504 321 Pharmaceutical Dosage Forms II
   Co : -
   Principle of sterile pharmaceutical and total parenteral nutrition preparations; nutrition therapy; sterile drugs and total parenteral nutrition administration; monitoring; counseling

1507 521 Drug Marketing 3 (3-0-6)
   Pre : -
   Co : -
   Principles; techniques in drug business; marketing strategies; drug business trend analysis; marketing surveys; need and consumer behavior surveys; product planning; price determination; sale promotion; customer services

1507 522 Quality Management and Assurance 3 (3-0-6)
   Pre : -
   Co : -
   Concepts of quality management; quality assurance; quality improvement and control; risk management; quality management tools; application of quality management in pharmacy services

1504 600 Pharmaceutical Clerkship in Pharmaceutical Manufacturing 5 (0-16-0)
   Pre : 1501 503 General Professional Practice
       1503 321 Pharmaceutical Chemistry Analysis I
       1504 321 Pharmaceutical Dosage Forms II
   Co : -
   Professional practice in pharmaceutical production; manufacturing management; manufacturing process of pharmaceutical dosage forms; in process quality control; quality control of finished products; pharmaceutical packaging; labeling; problems solving of manufacturing and laws; legislations; and standard guidelines for manufacturing

1504 601 Pharmaceutical Clerkship in Quality Assurance and Quality Control 5 (0-16-0)
   Pre : 1501 503 General Professional Practice
       1503 321 Pharmaceutical Chemistry Analysis I
       1504 321 Pharmaceutical Dosage Forms II
   Co : -
   Professional practice in operational planning for quality control and assurance of raw materials; in-process and finished pharmaceutical products; method validation of
pharmaceutical production processes and analytical methods; stability testing of active pharmaceutical ingredients and finished pharmaceutical products; national and international standards; agreements and regulations at national and international forums

1504 620 Pharmaceutical Clerkship in Cosmetics and Cosmeceuticals 5 (0-16-0)
Pre : 1501 503 General Professional Practice
1504 321 Pharmaceutical Dosage Forms II
1504 611 Cosmetic Sciences
Co : -
Professional practice in formulation design and development; manufacturing; analysis; quality control and assurance; and efficacy evaluation for cosmetics and cosmeceuticals; selection and quality control of raw materials; regulations; laws; legislation; standard guidelines related to manufacturing and quality assurance of cosmetic and cosmeceuticals

1504 621 Pharmaceutical Clerkship in Research and Development of Pharmaceutical Products 5 (0-16-0)
Pre : 1501 503 General Professional Practice
1504 321 Pharmaceutical Dosage Forms II
1504 400 Formulation and Development of Pharmaceutical Products
Co : -
Professional practice on research and development of drugs; delivery systems of pharmaceutical products; cosmetics; and health products

1504 622 Pharmaceutical Clerkship in Animal Pharmaceuticals and Foods 5 (0-16-0)
Pre : 1501 503 General Professional Practice
1503 321 Pharmaceutical Chemistry Analysis I
1504 321 Pharmaceutical Dosage Forms II
Co : -
Professional practice in formulation development; manufacturing; analysis; quality control and assurance for animal pharmaceuticals and foods; selection and quality control of raw materials; regulations; laws; legislation; standard guidelines related to manufacturing and quality assurance
1504 623 Pharmaceutical Clerkship in Pharmaceutical Equivalence and Bioequivalence
5 (0-16-0)
Pre: 1501 503 General Professional Practice
1503 321 Pharmaceutical Chemistry Analysis I
1503 520 Pharmaceutical Equivalence and Bioequivalence
Co: -
Professional practice on standard good clinical practice; procedure and study of pharmaceutical equivalence and bioequivalence; assay development and validation of drug from pharmaceutical dosage form and biological fluid; study design; protocol writing complied with standard good clinical practice; evaluation of pharmaceutical equivalence and bioequivalence for preparing drug specification

1504 624 Pharmaceutical Clerkship in Drug Registration
5 (0-16-0)
Pre: 1501 503 General Professional Practice
1503 321 Pharmaceutical Chemistry Analysis I
1504 321 Pharmaceutical Dosage Forms II
Co: -
Professional practice in registration procedures; document preparations for drug registration; related regulations; laws; legislations

1506 604 Pharmaceutical Care Clerkship in Drug Information Services
5 (0-16-0)
Pre: 1505 516 Drug Information Services
1506 600 Fundamental Professional Pharmacy Practice
Co: -
Pharmaceutical care practice in drug information services; Medication inquiry correspondence; primary, secondary, and tertiary data searching; evaluation of inquiry correspondence; systematic review; practice of verbal and writing skills with patients and other health care professionals; preparation of drug information for publication; writing drug monograph; preparation of drug information for hospital drug formulary approval; drug use evaluation; adverse drug reaction report

1506 610 Pharmaceutical Care Clerkship in Pediatric
5 (0-16-0)
Pre: 1506 600 Fundamental Professional Pharmacy Practice
Co: -
Pharmaceutical care for pediatric patients; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; practicing of communication skill; health care provider and patient relationship establishment
1506 611 Pharmaceutical Care Clerkship in Infectious Diseases 5 (0-16-0)

Pre  : 1506 600 Fundamental Professional Pharmacy Practice
Co   : -

Pharmaceutical care for infected patients; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; practicing of communication skill; health care provider and patient relationship establishment

1506 612 Pharmaceutical Care Clerkship in Psychiatry 5 (0-16-0)

Pre  : 1506 600 Fundamental Professional Pharmacy Practice
Co   : -

Pharmaceutical care for psychotic patients; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; communication skill practicing; health care provider and patient relationship establishment

1506 613 Pharmaceutical Care Clerkship in Neurology 5 (0-16-0)

Pre  : 1506 600 Fundamental Professional Pharmacy Practice
Co   : -

Pharmaceutical care for neurological patients; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; communication skill practicing; health care provider and patient relationship establishment

1506 614 Pharmaceutical Care Clerkship in Oncology 5 (0-16-0)

Pre  : 1506 600 Fundamental Professional Pharmacy Practice
Co   : -

Pharmaceutical care for cancer patients; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; communication skill practicing; health care provider and patient relationship establishment

1506 615 Pharmaceutical Care Clerkship in Surgery 5 (0-16-0)

Pre  : 1506 600 Fundamental Professional Pharmacy Practice
Co   : -

Pharmaceutical care for surgical patients; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; communication skill practicing; health care provider and patient relationship establishment
1506 616 Pharmaceutical Care Clerkship in Critical Care 5 (0-16-0)
   Pre  : 1506 600 Fundamental Professional Pharmacy Practice
   Co   : -
   Pharmaceutical care for critical patients; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; communication skill practicing; health care provider and patient relationship establishment

1506 617 Pharmaceutical Clerkship in Drug Marketing I 5 (0-16-0)
   Pre  : 1506 600 Fundamental Professional Pharmacy Practice
   Co   : -
   Principles; techniques of pharmaceutical business; marketing strategy; communication skills both oral and writing skills; moral; professional ethics; drug selling and marketing skills

1506 618 Pharmaceutical Clerkship in Drug Marketing II 5 (0-16-0)
   Pre  : 1506 600 Fundamental Professional Pharmacy Practice
   Co   : -
   1507 521 Drug Marketing
   Preparation of drug information for publication; writing drug monograph; preparation of drug information for hospital drug formulary approval; evidence based medicine for preparation of drug information for pharmaceutical marketing

1506 619 Pharmaceutical Care Clerkship in Primary Medical Care 5 (0-16-0)
   Pre  : 1506 600 Fundamental Professional Pharmacy Practice
   Co   : -
   Pharmaceutical care practice in primary medical care unit; working in a multidisciplinary team for patient care; therapeutic planning and monitoring; patient counseling; patient medication record; drug related problems and medication therapy management; communication skill on medication and self-management; patient transfer; screening for hypertension and diabetes mellitus, smoking cessation, health promotion

1506 620 Pharmaceutical Care Clerkship in Therapeutic Drug Monitoring 5 (0-16-0)
   Pre  : 1506 600 Fundamental Professional Pharmacy Practice
   Co   : -
   Pharmaceutical care for patient in therapeutic drug monitoring; pharmacokinetic parameters calculation in specific patient; dosage regimen adjustment; interpretation and recommendation and patient monitoring; working in a multidisciplinary team for patient care;
therapeutic planning and monitoring; patient counseling; practicing of communication skill; health care provider and patient relationship establishment