With this little guide we want to help you making your first steps of your Erasmus in Ankara University Faculty of Pharmacy. We look forward to welcoming you to Ankara.
MEET THE ERASMUS TEAM

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About Turkey

Turkey (Turkish: Türkiye), known officially as the Republic of Turkey, is an Asian country that stretches across the Anatolian peninsula in western Asia and Thrace in the Balkan region of southeastern Europe.

Turkey is a democratic, secular, unitary, constitutional republic, with an ancient cultural heritage. Turkey has become increasingly integrated with the West through membership in organizations such as the Council of Europe, NATO, OECD, OSCE and the G-20 major economies. Turkey began full membership negotiations with the European Union in 2005.

Area

Turkey has land area of 780,576 sq. kilometers, twice the size of California. The coastline is 7,200 km long, extending from the Black Sea in the North to the Mediterranean Sea in the South. Set in the Eastern Mediterranean, Turkey share borders with Greece and Bulgaria in
the West, Georgia and Armenia to the Northeast, Iran to the East and Iraq and Syria in the Southeast.

**Population**

An estimated over 70 million people, with an annual growth rate of 2%.

**Language**

The official language is Turkish. It is written in the Latin. Most Turks and especially those involved in the Tourism business speak excellent English and often French and German as well.

**Government**

Turkey has been a Republic since 1923. The form of government is a secular, Multiparty Democracy with a unicameral legislature, a President and a Prime Minister.

**Religion**

98% Muslim, Jews and Christians are present in the large cities.

**Economy**

Turkey has an industrialized economy with a large agricultural sector. Major sectors are automotive, iron and steel, household appliances and electronics, textiles and apparel, consumer goods, foodstuffs, pharmaceuticals, chemicals, cement, building materials, glass, ceramics and financial services. The economy is based on free-market principles, although the state sector is still quite large.

**Public Holidays**

Jan. 1st. New Year's Day

April 23rd. National Independence and Children's Day, (anniversary of the establishment of Turkish Grand National Assembly)

May 19 Atatürk Commemoration and Youth & Sports Day (the arrival of Atatürk in Samsun, and the beginning of the War of Independence)

August 30th. Victory Day, (victory over invading forces in 1922)

October 29th Republic Day. (anniversary of the declaration of the Turkish Republic)

Ramazan Bayramı / Sugar Feast: Three-day festival to celebrate the end of the fast of Ramazan.
Kurban Bayramı / Sacrifices Feast: Four-day festival (The dates of these religious festivals occur 12 days earlier each year.)

**Climate**

The Marmara, Aegean and Mediterranean coasts display a typical Mediterranean climate of hot summers and mild winters. July and August are the hottest months with temperatures around 30°C. The humidity is a little high during summer in these regions. Temperatures increase a few degrees when traveling to the south and water temperatures also become warmer. The swimming season is from June to September along the Marmara and North Aegean coasts, while it is from April to October on the South Aegean and Mediterranean coasts. The Black Sea Region has a moderate climate; the summers are warm and winters are mild. In this region the rainfalls are heavier than in any other region. The swimming season in the Black Sea Region is from June to early September and the weather is not so dependable. There is quite a difference between the coastal regions and the inland regions which are at higher altitudes. The climate reaches its extremes in central and eastern Anatolia with hot, dry summers when the temperatures may reach even 38-40°C, and cold, snowy winters. Spring and autumn are best for sightseeing and traveling.

**Electricity**

Turkey has 220 V power system. Please check your electric appliances before you use them.

**Hours**

Working hours are usually between 9 am - 6pm. For most offices and many bank branches close between 12 - 1:30 for lunch. Large stores and shopping malls are generally open from 10 am - 10 pm.

**Telephone Calls**

To dial abroad from Turkey, dial the international code 00 followed by the country code, and then the number including the local area code, but removing the first 0.

For example, a London number with an area code of 0207 would be dialed from Turkey as 00 44 207 followed by the number.

To dial Turkey from abroad dial the international code 00 followed by the country code, 90 and then the number including the local area code, but removing the first 0.

For example, a Fethiye number with an area code of 0252 would be dialled from abroad as 00 90 252 followed by the number.

There are public phone booths which accept cards or tokens (jeton) which can be bought from post offices (PTT) or local shops. Network coverage is extremely good and it is very rare to be in an area where your mobile does not work.
LIVING IN ANKARA

Cost of Living

Students are served four kinds of food with a reasonable price in the dining halls in every faculty and vocational school by the private firm under the contract with the University.

The foods are prepared under the supervision of a dietician and according to the season in a way that will contain the calorie and nutrition facts necessary for the students. Alternatively, canteens, cafeterias and restaurants are also available for students in campuses.

<table>
<thead>
<tr>
<th>Product</th>
<th>Prices in a shop*(TL)</th>
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</thead>
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<tr>
<td>Coffee</td>
<td>11/ 200 gr</td>
</tr>
<tr>
<td>Cola</td>
<td>1,5/ 1 lt</td>
</tr>
<tr>
<td>Bread</td>
<td>0.6</td>
</tr>
<tr>
<td>Milk</td>
<td>1,7/ 1 lt</td>
</tr>
<tr>
<td>Yoghurt</td>
<td>1,5/ 0,5 kg</td>
</tr>
<tr>
<td>Pasta</td>
<td>0,7/ 0,5 kg</td>
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<tr>
<td>Tomatoes</td>
<td>1/ 1kg</td>
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<tr>
<td>Bananas</td>
<td>5/ 1 kg</td>
</tr>
<tr>
<td>Chocolate</td>
<td>1,8/ 100 gr</td>
</tr>
<tr>
<td>Juice</td>
<td>1,8/ 1 lt</td>
</tr>
<tr>
<td>Beer</td>
<td>2,5/ 50 cl</td>
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<tr>
<td>Natural water</td>
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<td>Cinema</td>
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<tr>
<td>Theatre</td>
<td>6</td>
</tr>
</tbody>
</table>

HOW TO GET ANKARA

By Air

The International Esenboga Airport is 30 km north of the city center. Transportation is provided by BELKO AIR shuttle buses with a reasonable fare to the city centre.

Most of the airlines only flies to Atatürk Airport or Sabiha Gökçen Airport, which are in Istanbul. So you have to transfer to another vehicle; another airplane, train or bus. There are lots of bus companies routed between Ankara and İstanbul which takes 6-7 hours trip. It costs 40-50TLs. Also some of the local airlines can provide cheap tickets for 65TLs. (AtlasJet, Onur Air, Pegasus,…). Let us know which way you would prefer. Ankara Esenboga Airport is 30 km (21 miles, about 40 minutes in normal traffic) northeast of the city center, reached by inexpensive (6USD) airport shuttle bus (BELKO AIR) to/from the ASTI bus terminal or Ankara Gar train station. A metered taxi would cost about 35USD. From the airport shuttle
bus stations in downtown Ankara (one near the Gar train station, and the other at the bus station ASTI), one can take a metered taxi to the hotel.

**From other cities:**

**By Road**

It is possible to get to any point in Turkey from Ankara by bus, and even further afield with services to surrounding countries - even Moscow. The main bus station is 5km west of Kizilay, with over 100 bus companies operating from there. Many local buses and companies are operating to and from the city centre.

Also you can come to Ankara by road. But we don’t advice you to use this way because of the road’s situation and custom regulations. The participants from İstanbul, Greece, Croatia, Romania, Hungary, Serbia and Montenegro may use this method.

**By Train**

There are direct railway services to the following destinations:

Istanbul, Izmir, Balikesir, Isparta and Burdur, Zonguldak, Adana, Elazig and Diyarbakir. As with all reservations in Turkey, the fast trains get booked up quickly, as do sleepers, so booking ahead is strongly recommended.

**Useful Contacts:**

Turkish Airlines (THY) at Esenboga Airport: www.turkishairlines.com

Tel: (+90 312) 398 0000 / 1517 or (+90 312) 398 0550.

THY City Offices Tel: (+90 312) 419 1492; (+90 312) 428 0200. Fax: (+90 312) 428 1681

BELKO AIR Esenboga Airport: Tel: 444 9 312
POPULAR TOURISTIC DESTINATIONS CLOSE TO ANKARA

**Beypazarı:**

Beypazarı is a town and district of Ankara Province in the Central Anatolia region of Turkey, approximately 100 km west of the city of Ankara. Beypazarı today is a small town in a rural district famous for its carrots, (producing nearly 60% of Turkey's carrots), silverwork (Telkari), a high quality natural mineral water and of course bakery which is called Beypazari Kurușu. The crystal mineral trona, a kind of natural soda used in glass-making is extracted in Beypazarı. With its rich history, architectural heritage and attractive rocky countryside Beypazarı is becoming increasingly attractive to visitors, especially day-trippers from Ankara. Every June the town holds its popular Traditional Historical Houses, Handicrafts, Carrot and stew Festival. The visitors of course are bringing valuable income to the town, shopping for silverware and providing good custom for the food markets and restaurants. Beypazarı is a member of the European Association of Historic Towns and Regions (EAHTR).

**Kızılcahamam:**

Kızılcahamam is at 80 km distance from Ankara and is known for its pine forests, healing waters, thyme & pine honey, modern tourist facilities. With its unique natural beauty, abundant water resources and gates of Kargasekmez and Azaphane which are connecting the North and South, it has been the center of attraction since ancient times. Due to its thermal tourism Ankara-Kızılcahamam has an important place in Turkey and with the Thermal Hotels in the region it is serving four seasons. The interesting structure makes it a favored region for summer and winter tours for relaxing, sports, mountain tourism and nature tours. Soğuksu National Park with its original landscape, emerald green view and natural wealth is attracting visitors in all seasons.

**Eskişehir:**

The city is home to about 500,000 people and two of Turkey’s biggest universities—Anadolu University and Eskişehir Osmangazi University—therefore the city is widely nicknamed as "students’ city" in Turkey. The name Eskişehir translates to "the old city" in Turkish, a fitting name as the city fully embraces modern life while still maintaining a sense of tradition and ancient values. This city that has been considered as a very important city since the early years of Ottoman Empire establishment, was used to be called Sultan Önü. Later on this city has lost its real value and had an appearance of abandon. The public who also missed their old luxurious days began to call this city Eskişehir (Oldcity). This city is famous for the historical characters such as Yunus Emre, Nasreddin Hoja, hot water thermals which cure the various diseases, production and dressstone the of sea foam. The first residential area of this city is Odun Bazaar. (Wood Bazaar). Pirörük Creek with boat trips and national parks are some of the important places for seeing. Eskişehir aims to be an important tourism center with its cultural richness, natural beauty, rich kitchen as well as shopping opportunities.
**Konya:**

The important religious centre of Konya is a hub crammed with museums and monuments demonstrating Seljuk splendour. Most people make a stop here simply to see the Mevlana Museum and the tomb of the whirling dervish founder Mevlana Rumi who wrote his famed poetry here in the 13th century. But this central Anatolian city is packed full of architectural attractions, mosques and historic medreses that showcase the artistry of the Seljuk sultanate. Anyone with an interest in Turkey's history shouldn't miss a visit here.

**Cappadocia:**

The area is a popular tourist destination, as it has many areas with unique geological, historic, and cultural features. Touristic Cappadocia includes 4 cities: Nevsehir, Kayseri, Aksaray and Nigde. The region is located southwest of the major city Kayseri, which has airline and railway service to Ankara and Istanbul and other cities. The most important towns and destinations in Cappadocia are Ürgüp, Goreme, Ihlara Valley, Selime, Guzelyurt, Uchisar, Avanos and Zelve. Among the underground cities worth seeing are Derinkuyu, Kaymakli, Gaziemir and Ozkanak. The best historic mansions and cave houses for tourist stays are in Urgup, Goreme, Guzelyurt and Uchisar. Hot-air ballooning is very popular in Cappadocia and is available in Goreme. Trekking is enjoyed in Ihlara Valley, Monastery Valley (Guzelyurt), Urgup and Goreme. The Göreme Open Air Museum is the most visited site of the monastic communities in Cappadocia and is one of the most famous sites in central Turkey. The complex contains more than 30 carved-from-rock churches and chapels, some having superb frescoes inside, dating from the 9th century to the 11th century.

**Bolu - Abant Lake:**

The Abant Lake Natural Park takes place within the borders of Bolu Province Central District in Karadeniz (Blacksea) Region. The park is 33 km far away from Bolu, 225 km far away from Ankara, and 225 km far away from Istanbul. The Abant Lake, which is a tectonic structure, shelters a variety of plants in itself and have a great open air recreation potentiality. As a result of these characteristics of the lake, 1150 hectares of it had been taken under the status of Natural Park in the year 1988. The period between May and September is the best times for visiting the park. Some hotels are present in the park for billeting. The daily visitors can take walks around the lake or make picnics.

**Safranbolu - Amasra:**

Safranbolu is in Western Black Sea Region, Turkey, though located 50 km inland on the mountains. Buses from Ankara take around 3 hours. If you want to go by car from Ankara, it is 220 kms. Safranbolu is famous for its Ottoman houses both in Çarşı (old town) and the neighbourhood of Bağlar (literally "orchards"), and qualifies as a UNESCO World Heritage site. From Safranbolu you can go, with bus or minibus which you can find at the bus terminal, to Amasra, a little touristical Black Sea village, two hours away, which is popular with local people as well as with turkish tourists coming from Ankara and Istanbul. The Castle of
Amasra and Bird’s Rock Road Monument, inherited from the Roman Empire, are the two main historical places that should be seen. The beaches are crowded, so you may choose to swim at the places near to the castle or the breakwater if you have confidence in your swimming skills. In Amasra it is also possible to find some good fish restaurants with a good view of Karadeniz (Black Sea).

**Akçakoca:**

Akçakoca is a small town in the Western Karadeniz region of Turkey. From both Istanbul and Ankara, it takes more or less around 3 hours to get to Düzce, which is a further half hour away from Akçakoca. Kale Plajı ("the castle beach") just below the Genoese castle was briefly awarded "Blue Flag" which guarantees seawater purity in early 2000s. Although having lost that distinction since, it's reported to be still clean enough to swim safely, in fact it's said to be still one of the cleanest beaches and seawater in the vicinity.

**Kerpe:**

Kerpe is a small bay which has quite suitable geographic location in terms of north winds and which leans against the thick pine forest. For this reason, that famous wave of Black Sea cannot be seen here and it is very advantageous for the families who have children because the sea is not so much deep. When we add another feature for Kerpe, that is, its being very close to Istanbul which is a very important metropolis, it can be said that it is a candidate which can host foreign and domestic tourism. It has an important tourism potential with its hotels, motels, lodgings, and restaurants which are open the whole year.

**HEALTH CARE**

Foreign students should apply for the Health Certificate during their first registrations. You should get the related application form from the person who makes your first registration at Students Affairs Office. You should fill that form and deliver by hand to the Directorate of Health Culture and Sports in Dikimevi Campus. Ankara University students only can be treated with their Students ID Cards and Health Certificates. Foreign Students can be treated both at polyclinics at The Directorate of Health, Culture and Sports in Dikimevi Campus and Ankara University Hospitals. If the facilities are not enough to treat at polyclinics, they can forward you to Ankara University Hospitals.

Criteria for evaluation of foreign students’ documents for health certificate:
- Copy of the passport (The page with your photo that shows prolonged dates) or,
- Copy of your residence permit (The page with serial number and your photo that shows prolonged dates)

TEL: 0 (312) 595 76 03

Web: [http://sks.ankara.edu.tr/](http://sks.ankara.edu.tr/)
**LANGUAGE COURSES**

For free Turkish Lessons from pharmacy students please contact us.

TÖMER provides an adequate educational environment for the teaching of Turkish and foreign languages in Turkey. See more: [http://www.tomer.ankara.edu.tr/english/](http://www.tomer.ankara.edu.tr/english/)

Today, as many as 20 languages including Turkish, English, German, French, Spanish, Italian, Russian, Japanese, modern Greek, Dutch, Bulgarian, Chinese, Ottoman language, Arabic and Central Asian Turkic languages are taught in TÖMER.

**LIBRARY**

E-Library : [http://www.ankara.edu.tr/kutuphane/e_kutuphane.html](http://www.ankara.edu.tr/kutuphane/e_kutuphane.html)


**SPORTS**

*Ankara University Olympic Swimming Pool*

The Olympic Pool facilities comprise a 50-metre heated pool, sauna, fitness center, cafeteria and terrace for sunbathing. Here you will also find products with Ankara University logo in Gift Shop. The pool is open 7 days in a week.

*Other Sports Facilities*

Sports Facilities for students in Ankara University are planned, managed, and organised by Directorate of Health, Culture and Sports. There are 5 covered Gymnasium and 1 Olympic swimming pool in Ankara University. In addition, there are open football fields, volleyball courts, basketball fields and tennis courts in each faculty. Ankara University Traditional Sports Festival is organised every year with joining of about 2000 students.

**TURKISH COURSES FOR SPECIFIC PURPOSES**

1. **Courses in “Diction and Public Address” for Accurate and Effective Speech**
   This course covers a period of 2 months, a total of 48 class hours.

2. **Courses in “Speed Reading” to Keep Abreast with the Changing Times**
   This course covers a total of 20 class hours.

3. **The Education Pack “New Hitit Turkish For Foreigners”**
The pack has 3 different levels (basic, intermediate, upper-intermediate) based on the criteria in Common European Framework established by the European Council. The packs for each level consist of 1 class book, 1 workbook, 1 teacher’s book (for only New Hitit 1) and listening scripts on CD.

Please ask for special Discounts

USEFUL INFORMATION

Money

Turkey’s currency is the Türk Lirası (Turkish Lira; TL). Lira comes in coins of 1, 5, 10, 25 and 50 kurus and a 1 lira coin, and notes of 5, 10, 20, 50 and 100 lira.

ATMs

ATMs dispense Turkish lira to Visa, MasterCard, Cirrus and Maestro card holders. Look for these logos on the machines; they are found in most towns and places. Virtually all the machines offer instructions in English, French and German. Always keep some cash in reserve for the inevitable day when the machine throws a wobbly, or it’s a holiday. You can usually draw out about €350 per day.

Cash

US dollars and euros are the easiest currencies to change, although many banks and exchange offices will change other major currencies.

Credit cards

Visa and MasterCard/Access are widely accepted by hotels, shops, bars and restaurants.

Moneychangers

It’s easy to change major currencies in exchange offices and banks. They charge a reasonable commission.

Gsm Operators and Mobile Phones

In Turkey we have 3 main GSM Operators. They are;
Turkcell; www.turkcell.com.tr
Avea; www.avea.com.tr
Vodafone; www.vodafone.com.tr
In order to register your phone, You should need the documents below:
1) The document that shows you are a student (You’ll get it from the University)
2) Passport (Original Copy)
For more Information; Please visit the page of Information Technologies and Communication Association www.tk.gov.tr.

Emergency Calls

112 Medical Emergency (First aid)  
110 Fire  
156 Gendarmerie  
155 Police  
154 Traffic  
114 Poisoning Information  
169 Alo Post  
187 Gas Failure  
186 Electricity Failure  
126 Cable-TV Failure  
177 Forest Fire  
119 Postal Code Info  
182 Psychological Crisis  
184 Health Info  
185 Water Failure  
121 Telephone Failure  
11811 Unknown Number Info  
113 Doctor  
170 Tourism Info  
171 Drug Info  
174 Security Info  
181 Environmental Info
ACCOMMODATION POSSIBILITIES FOR ERASMUS STUDENTS

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If you would like to share a flat with one of our Pharmacy student’s for free please contact us (sibel@pharmacy.ankara.edu.tr)

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Erasmus student can stay in the following Student Dormitories.

Ankara University Directorate of Health, Culture and Sports help you on accommodation and dormitories. You can find the list of the dormitories and other informations about accommodation below;

<table>
<thead>
<tr>
<th>Dormitory</th>
<th>Capacity</th>
<th>Rooms</th>
<th>Address</th>
<th>Tel</th>
<th>Fax</th>
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<tbody>
<tr>
<td>Milli Piyango Ladies’ Dormitory</td>
<td>356</td>
<td>Double (for two) &amp; Triple (for three)</td>
<td>Cebeci Kampusu Ankara</td>
<td>+90 312 362 97 51-54</td>
<td>3624119</td>
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<tr>
<td>Vehbi Koç Gentlemans’ Dormitory</td>
<td>194</td>
<td>Double (for two) &amp; Triple (for three)</td>
<td>GMK Bulvari No: 75 Maltepe/Ankara</td>
<td>+90 312 229 63 04</td>
<td>+90 312 231 85 93</td>
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Facilities: Each room includes beds, table, wardrobes. Shared bathrooms and WCs on each floor. Internet room, Ironing room, TV room, Cafeteria, Laundry, Restaurant, Barber, Tailor
<table>
<thead>
<tr>
<th>Dormitory</th>
<th>Capacity</th>
<th>Rooms</th>
<th>Address</th>
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<tr>
<td>Yıldırım Beyazıt Ladies’ Dormitory</td>
<td>130</td>
<td>Double (for two) &amp; Triple (for three)</td>
<td>Dışkapı Kampusu Dışkapı Ankara</td>
<td>+90 312 317 13 29</td>
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<td>Yıldırım Beyazıt Gentlemans’ Dormitory</td>
<td>180</td>
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<td>Dışkapı Kampusu Dışkapı Ankara</td>
<td>+90 312 347 05 11</td>
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<tr>
<td>Keçiören Dormitory</td>
<td>60</td>
<td></td>
<td>Fatih Cad. No:197 Keçiören/Ankara</td>
<td>+90 312 380 93 73</td>
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<td>Cumhuriyet Ladies’ Dormitory</td>
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<td>Double (for two) &amp; Triple (for three)</td>
<td>Dikimevi Kampusu Cebeci Ankara</td>
<td>+90 312 319 85 30</td>
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For more information and details please visit: http://sks.ankara.edu.tr/or contact with us to help you (zeynepkarabay@yahoo.com)
**CURRICULUM OF THE**

**ANKARA UNIVERSITY OF FACULTY OF PHARMACY**

*T*: Theoretical, *P*: Practical

**1st Year**

### Fall Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>T/P</th>
<th>hr/week</th>
<th>Total</th>
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<tr>
<td>ATA101</td>
<td>Principles of Ataturk and History of the Turkish Republic I</td>
<td>T</td>
<td>2</td>
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<td>YDI101</td>
<td>Foreign Language (English) I</td>
<td>T</td>
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<td>TDI101</td>
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<tr>
<td>ECZ155</td>
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<td>ECZ157</td>
<td>General Chemistry I</td>
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Total: 21 ECTS

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Total: 20 ECTS

* A total of 2 ECTS credits are required from this group.
### 2nd Year

#### Fall Semester

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* A total of 2 ECTS credits are required from this group.

#### Spring Semester

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* A total of 2 ECTS credits are required from this group.
### 3rd Year

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**A total of 4 ECTS credits are required from this group.**

#### Spring Semester

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**A total of 4 ECTS credits are required from this group.**
### Fall Semester

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** A total of 4 ECTS credits are required from this group.

### Spring Semester

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** A total of 4 ECTS credits are required from this group.
### 5th Year

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*** A total of 10 ECTS credits are required from this group.

#### Spring Semester

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Total ECTS credits: 300

### COURSE DESCRIPTION OF THE OBLIGATORY COURSES

#### (FIZ131) PHYSICS (T)

*Hour/Week: 2, ECTS: 4*

Measurement in Physics (Physical magnitude, standards, unit systems), vectors (addition and multiplication), Motion along a line (Velocity, acceleration, freely falling), dynamic of particle I,II, (Newton’s Law, frictionless and frictional motion), Work and Energy (Work-Energy Theorem, Power), The Energy Conservation Law (Potential Energy, Kinetic Energy, Conservation of total Energy), dynamic of particle systems (Mass center, linear momentum and it is conservation) and collision, Charge and matter (Coulomb’s Law, Electrical Charge Conservation), Electric Field (E) (Calculation of Electric Field, Point Charge in a Electric Field), Electric Potential (Potential and Potential Energy realizing to groups of point charge), Capacitors and Dielectrics (Calculation of capacitance, capacitance in the dielectric Media), Electric Circuits (Current and Potential Calculations in a single and Multiloop circuit), Magnetic Field (B defined, Magnetic Force on a current-carrying conductor) subjects are involved.
(MAT123) MATHEMATICS (T)

Hour/Week: 2, ECTS: 5


(ECZ155) PLANT BIOLOGY (T)

Hour/Week: 2, ECTS: 5


(ECZ157) GENERAL CHEMISTRY I (T)

Hour/Week: 3, ECTS: 6

Structure of atom, its theories (discovery of electrons and nucleus), properties of atoms; Periodic system (general properties): energy level of electrons, wave characteristics of electrons, spin of electrons, quantum number, atomic radius, ionization potential (ionization energies), electron affinity, Chemical bonding: electronegativity, molecular geometry, hybridization, molecular orbitals (theory and their shapes), Stoichiometry: atom-gr, mole and equivalent gram concepts, calculation of empirical formulae, calculation of molecular formulae, chemical reactions oxidation number; Redox: balancing the chemical equations, chemical equations and related calculations, Gases: gas laws (Boyle’s law, Charles’s law, Dalton’s law, Avagadro principle, Graham’s law, equations of state), the kinetic theory of gases, real gases, the ideal gases, liquefaction of gases, dissolution of gases in liquids, Henry’s law, related problems, Liquids: general properties, equilibrium vapor pressure, boiling point, heating and cooling curves; phase diagrams, related problems, Solutions: concentration units, vapor pressure (Raoul’s law), boiling point, freezing point; electrolytes, percent resolution, ionic forces of attraction, solubility, related problems, Solids: general properties, geometry of solid, related problems
(ECZ156) GENERAL CHEMISTRY II (T)

Hour/Week: 2, ECTS: 4

Chemical kinetics: reaction rates, concentration which is effective on rate, rate equations, other factors which are effective on rate (temperature, catalyzer, activation energy), order of reactions and determination methods, collision theory, absolute reaction rate theory and calculations, Chemical equilibrium: equilibrium state, mass action, equilibrium constants, Le Chatelier’s principle, factors which are effective on the equilibrium, heterogeneous equilibrium and related calculations; Electrochemistry: electrical conductivity, electrolyses and law’s, galvanic cell, Nernst equation and related problems; Nuclear chemistry: structure of nucleus, radioactivity, nuclear energy, nuclear reactions and examples, radiochemistry, nuclear fission and fusion and problems; Thermodynamic: systems and functions, laws of thermodynamic, the first law of thermodynamic, energy, enthalpy, the second law of thermodynamic, entropy, chemical activity, the Gibbs free energy and chemical equilibrium, related problems.

(ECZ159) GUIDANCE TO PHARMACY (T)

Hour/Week: 2, ECTS: 4

Introduction, constitutional provisions about universities, fundamental conceptions in higher education law, university, faculty, college, section, department, discipline concepts, introduction of University of Ankara, introduction of Pharmacy Faculty of University of Ankara, introduction of their academically and administrative structure, sections, departments, and disciplines, administrative units, education regulations, training course instructions, student discipline regulation, graduate and postgraduate education in pharmacy, conceptions of pharmacy and pharmacist, duties, responsibilities, international associations establishments about pharmacy, Ministry of Health, Ministry of Labor and Social Security, Turkish Pharmacists Association, regional pharmacist chambers, World Health Organization, International Pharmaceutical Federation, several foreign pharmacy associations, conceptions of health and illness, medicine, conceptions of active substance of medicine and excipient substance of medicine, classification of medicines, pricing of medicines, conception of pharmacy shop, conception of pharmaceutical warehouse, introduction of pharmaceutical industry, duties and responsibilities of a pharmacist in health protection and therapy, pharmacist-patient relationships, conception of prescription, conceptions of deontology and ethics, conception of research and publication in pharmacy, introduction of important pharmaceutical journals.

ENF101 Fundamentals of Computer Science (T)

Hour/Week: 2, ECTS: 1

A brief information on history of computer, a brief information on the hardware (Main board, Memory, Central Processing Unit (CPU) etc.), Input devices, Output devices, Input/Output devices; Disc operating systems, WINDOWS operating system, general properties of WINDOWS; Word processors, Microsoft Word 2000, loading Microsoft Word 2000, Menus;
File, Edit, View, Insert, Format, Tools; Microsoft Excel 2000, loading Microsoft Excel, calculation chart and formulas, order of arithmetic, graphs; Microsoft PowerPoint 2000, loading PowerPoint, creating new slide, editing slide; Data transfer between Microsoft office programs, object linking, object embedding, copy-paste.

(ECZ150) MEDICAL BIOLOGY (T)

**Hour/Week:** 2, **ECTS:** 4


ECZ158 BIOSTATISTICS (T)

**Hour/Week:** 2, **ECTS:** 3

The basic concepts of statistics; Descriptive statistics, Measures of central tendency; Measures of dispersion; Statistical distributions; Binomial distribution, Poisson distribution, Normal distribution, standard normal distribution; Correlation coefficient, regression coefficients, regression equation, regression line, determination coefficient; Sampling distributions; Hypothesis testing, hypotheses, test statistics, Type I and Type II errors, one- and two tailed tests; Z-distribution and hypothesis testing; t-distribution and hypothesis testing; Confidence intervals; Chi-square distribution, test of homogeneity, tests of goodness-of-fit, test of independence, F-distribution, analysis of variance technique, multiple comparison tests (least significant difference, Tukey (a) method).

(ECZ152) PHARMACEUTICAL BOTANY (T)

**Hour/Week:** 3, **ECTS:** 4

Distribution of medicinal plants according to the phylogenetics system, their general features, usages, drugs obtained from them, major active substances and their effects are examined. In addition, Flora of Turkey is also introduced. Poisonous plants, economical plants and the ones used in traditional medicine are also within the scope of the lecture. Under this scope, the main titles are: Nomenclature of Plants and Drugs, Classification of Plants, Bacteriophyta, Phycophyta, Mycophyta, Pteridophyta, Spermatophyta, Gymnospermae, Angiospermae, Monocotyledonae, Dicotyledonae, Apetalae, Dialypetalae, Sympetalae.
**PHARMACEUTICAL BOTANY (P)**

*Hour/Week: 4, ECTS: 4*

Leaves and other organs of plants that are used in the treatment; and also specimens belonging to lichens, mushrooms (fungi), pteridophytes and conifers are examined. The morphological and anatomical structures of the organs like leaf, cortex, radix, fruit and flower of the plants used in the treatment are examined. The examination of the characteristic elements of herbal teas and powdered drugs by means of microscope are within the scope of this lecture. Under this scope the main titles are: Leaf morphology, Microscopically Analysis of Starches, Lichens, Pteridophyta, Cross-Section and Powdered Drug Analysis of Leaf, Cross-Section and Powdered Drug Analysis of Underground Parts, Cross-Section and Powdered Drug Analysis of Cortex, Flower Morphology, Microscopically Analysis of Herbal Teas, Microscopically Analysis of Narcotic Herbs.

**ANATOMY (R)**

*Hour/Week: 2, ECTS: 4*

The aim of Human anatomy course is to describe the relationship between form and function. The main topics are locomotor system, (knowledge of bone, joint and vurcle ), peripheral vessels, organ system, central nervous system and sense organs.

**PUBLIC HEALTH (T)**

*Hour/Week: 1, ECTS: 2*

General introduction to health, studies in public health, health care and laws in Turkey, mortality and morbidity rates, infectious diseases, immunization and related programs, nutrition in the context of public health, environmental health, health education, hygiene

**ANALYTICAL CHEMISTRY I (T)**

*Hour/Week: 3, ECTS: 4*

Law of mass action, solutions and concentration units of the solutions, neutralimetry, pH-value, pH calculations, buffer solutions, calculations in titrimetry, indicators, neutralization titrations (acid-base titrations) and related examples, theory of redox (concepts, calculations of potentials, redox titrations, examples), precipitation (reactions, titrations, examples and calculations) and problems about all the methods.

**ANALYTICAL CHEMISTRY II (T)**

*Hour/Week: 3, ECTS: 4*

Complexes (theory, classification, calculations, examples for complexometric titrations,) activity, activity coefficient (concept and mathematical bases), Instrumental analysis; Spectrophotometric methods (concepts, classification, atomic absorption, UV-Visible and IR spectrophotometry), their applications and calculations; Electroanalytical methods;
potentiometry (electrodes and titrations), voltammetry and polarography and, conductometry (theory, applications and calculations), Separation techniques; chromatographic separations (theory, types of chromatography, their applications and calculations), polarimetry and other spectroscopic methods; mass spectrometry and NMR (theories, their applications and calculations)

(ECZ283) ANALYTICAL CHEMISTRY I PRACTICE (P)

*Hour/Week: 4, ECTS: 5*

In this laboratory, qualitative analyses of anions and cations are realized. Theoretical explanation of the analysis is given at the beginning of each laboratory study. This is followed by the qualitative experiment for the investigated ions. Unknown samples are given for each group and the experiments are realized based on the systematic analysis. Moreover, material knowledge and the principles of the systematic analysis are described.

(ECZ282) ANALYTICAL CHEMISTRY II PRACTICE (P)

*Hour/Week: 4, ECTS: 4*

The quantitative analyses are realized in this laboratory. Active compounds in drugs, as in solution and solid type, have been quantitatively determined using titrimetric analysis (based on acid-base, redox, precipitation and complexation reactions), gravimetric, spectrophotometric, electroanalytic (potentiometric and polarographic techniques) and chromatographic techniques (TLC, paper and HPLC analysis) the evaluation of the experimental results, are within the scope of this laboratory.

(ECZ285) ORGANIC CHEMISTRY I (T)

*Hour/Week: 2, ECTS: 4*


(ECZ284) ORGANIC CHEMISTRY II (T)

*Hour/Week: 3, ECTS: 4*

Heterocyclic compounds, nomenclature, general synthesis method of heterocyclic compounds.

(ECZ287) PHARMACEUTICAL MICROBIOLOGY AND IMMUNOLOGY (T)

Hour/Week: 3, ECTS: 4

History and importance of microbiology, Classification of microorganisms and classification criteria, Structures of microorganisms, Reproduction of microorganisms, Metabolisms of microorganisms and their enzymes, Genetics of bacteria, Variations on microorganisms, Transfer methods of genetic materials in bacteria, Effects of environment on microorganisms, Sterilization and Sterilization methods, Disinfection and antisepsis, Chemotherapeutic drugs and their effect mechanisms on microorganisms, Relationship between microorganisms and their environment, Parasitismus, Resistance of living-organism to microorganisms, Acquired immunity, Immune response, Antigens, Antibodies, Mechanism of immune response, Interleukins and Interferons, Apoptosis, Types of sensitivity reactions, Tumor immunology, Transplantation immunology, Vaccines and Immune serums.

(ECZ286) PHARMACEUTICAL MICROBIOLOGY (T)

Hour/Week: 2, ECTS: 3

Virology, Bacteriology, Vibrionaceae, Non-fermentative gram negative bacilli, Aerobe gram negative small bacilli, Facultative anaerobe gram negative bacilli, Curved gram negative bacilli, Gram positive cocci, Neisseriaceae, spore-forming gram positive bacilli, non-spore-forming gram positive bacilli, Actinomyces and Nocardia, Spirochaetaceae, Mycoplasmataceae, Rickettsiaceae, Chlamydiaceae.

(ECZ288) PHARMACEUTICAL MICROBIOLOGY PRACTICAL (P)

Hour/Week: 4, ECTS: 4

Tools and materials that used in microbiology laboratory, Culture media, Biochemical identification tests for bacteria, Identification methods of bacteria, Capsule and spore staining procedures, Simple and gram staining procedures, Antimicrobial susceptibility testing for bacteria, Serologic reactions, Mycobacteriaceae, Laboratory animals and inoculation methods, Microbiologic quality controls of the drugs, Tissue culture, Inoculation methods to chicken egg with embryo, Parasitic examination of blood and stool specimens,

(ECZ289) BIOCHEMISTRY I (T)

Hour/Week: 2, ECTS: 3

Protein Chemistry, Enzymes, Coenzymes and Vitamins, Carbohydrate Chemistry and Metabolism

And Biological Oxidation.
(ECZ290) BIOCHEMISTRY II (T)
Hour/Week: 3, ECTS: 4
Chemistry and Metabolism of Lipids, Metabolism of Proteins and Amino Acids, Chemistry and Metabolism of Nucleic Acids, Protein Biosynthesis and its Regulation, Hormones, Acid and Base Equilibria, Minerals

(ECZ292) BIOCHEMICAL PRACTICE (P)
Hour/Week: 4, ECTS: 4
Qualitative and Quantitative analysis of Carbohydrates, Lipids and Proteins, blood and urine analysis, several enzyme tests evaluation of the biochemical tests and clinical information.

(ECZ291) PHYSIOLOGY (T)
Hour/Week: 3, ECTS: 5
Functional organization of body and homeostasis, cellular physiology, structure of cell membrane and transport across cell membranes, intercellular communications, physiology of nerve and muscle cells, nervous system, cardiovascular system, respiratory system, gastrointestinal system, urinary system, endocrinology and reproductive system

(ECZ295) PHARMACY HISTORY AND DEONTOLOGY (T)
Hour/Week: 1, ECTS: 2
Historical evolution of pharmacy is taught in history methodology; especially Turkish Pharmacy History from the Seljuk Anatolia and history of pharmaceutical industry and publications are taught. Conceptions of deontology and ethics, patient rights and their applications in the World and Turkey are taught to students.

(ECZ381) PHARMACOGNOSY I (T)
Hour/Week: 2, ECTS: 3
This course deals with the general features, classification, identification, estimation, isolation, biological activity and indication of some crude drugs including carbohydrates (monosaccharides, oligosaccharides, polysaccharides), cardiac glycosides, saponins, cyanogenic glycosides, glucosinolates, anthraquinones have been described.

(ECZ382) PHARMACOGNOSY II (T)
Hour/Week: 2, ECTS: 2
This course deals with the general features, classification, identification, estimation, isolation, activity and indication of some crude drugs including flavonoids, anthocyanins, phenolic glycosides, coumarins, tannins, lipids, terpenoids and volatile oils have been described.

**ECZ383** PHARMACOGNOSY I PRACTICE (P)

*Hour/Week: 4, ECTS: 2*

In this laboratory, microscopically analysis, pharmacopeial analysis, isolation methods qualitative and quantitative estimation of some drugs including, carbohydrates (monosaccharides, oligosaccharides, polysaccharides), cardiac glycosides, saponins, cyanogenic glycosides, glucosinolates, anthraquinones have been done.

**ECZ384** PHARMACOGNOSY II PRACTICE (R)

*Hour/Week: 4, ECTS: 4*

In this laboratory, microscopically analysis, pharmacopeial analysis, isolation methods qualitative and quantitative estimation of some drugs including, flavonoids, anthocyanins, phenolic glycosides, coumarins, tannins, lipids, terpenoids and volatile oils have been done.

**ECZ385** PHARMACEUTICAL CHEMISTRY I (T)

*Hour/Week: 4, ECTS: 5*

The mission of the Pharmaceutical Chemistry I course is to introduce students to the chemical formula, general physico-chemical and structural properties, synthesis, chemistry of metabolites structure-activity relationships of pharmaceutical agent. Topics include introduction to pharmaceutical and medicinal chemistry, a. Drug active material design and development methods, b. Quantitative Structure Activity Relationship (QSAR), chemistry of drug metabolism, Local and general anesthetics, Sedative and Hypnotic drugs, Tranquillizer drugs, Neuroleptic drugs, Myorelaxant and antiepileptic drugs, Antidepressant drugs, Narcotic analgesic drugs, Non-narcotic analgesic drugs, Non-steroidal Anti-inflammatory Drugs.

**ECZ386** PHARMACEUTICAL CHEMISTRY II (T)

*Hour/Week: 3, ECTS: 4*

Pharmaceutical Chemistry II provides the general aspects of drug molecules consisting of their chemical structures, chemical nomenclature, physicochemical properties, synthesis schedules, metabolism, stabilities, chemical analysis and their interaction with biological systems. Under this generalization, chemotherapy and chemotherapeutics, beta-lactam antibiotics, beta-lactamase inhibitors, antibiotics derived from polypeptides, macrolitics, aminoglycosites, other antibiotics (tetracyclines, chloramphenicol), sulfonamides, quinolone compounds, antituberculosis drugs, antifungals, antiviral drugs and antineoplastic drugs, are counted.

**ECZ387** PHARMACEUTICAL CHEMISTRY PRACTISE I (P)
The experimental studies of Pharmaceutical Chemistry I covers the generalized topics for laboratory safety, laboratory devices and the usage techniques along with separation of organic molecules and purification in which a) Crystallization, b) Extraction, c) Distillation, d) Chromatography (thin-layer, column, paper), e) Capillary electrophoresis, f) HPLC methods are considered. Additionally, computer-aided drug design and development methods including 1) Quantitative structure-Activity Relationships (QSAR), 2) Molecular Modeling Techniques are performed with using computer programs such as Minitab, ChemSketch, and ChemDraw.

(ECZ388) PHARMACEUTICAL CHEMISTRY PRACTISE II (P)

Hour/Week: 4, ECTS: 4

The synthesis of certain chemical compounds which are supposed to bear drug-like properties and/or drug starting chemicals are performed, such as 1) Iodophorm, 2) Benzyl alcohol, 3) p-Nitrosoacetanilide, 4) Hydrolysis of Aspirin, 5) Benzocaine, 6) Benzoine, 7) Benzyl, and 8) Benzylic acid. The course curriculum also covers the synthesis of compounds such as, 1) Benzilidene aniline, 2) Phenyl azo beta-naphthol, 3) Hydrolysis of p-Nitroacetanilid, 4) Ethyl acetate, 5) Acetanilide, 6) Dibenzalacetone, 7) Benzyl phenoxime, 8) Diazooaminobenzene.

(ECZ389) PHARMACEUTICAL TECHNOLOGY- I (T)

Hour/Week: 3, ECTS: 4

Introduction to pharmaceutical technology, Pharmaceutical measurements and units, Preparation and control of water for pharmaceutical usage (Distilled water, etc.) Preformulation, Properties of active agents (Stability, Solubility, Dissolution rate, etc.), Unit operations (Drying, Grinding, etc.). Pharmaceutical solutions, Extraction technology and pharmaceutical preparations prepared by extraction, Dressing materials and surgical materials, Classification of dressing materials (samples, properties and controls).

(ECZ390) PHARMACEUTICAL TECHNOLOGY- II (T)

Hour/Week: 3, ECTS: 4

Colloids and multi-phased systems, Suspensions (Classification of disperse systems, formulation of suspensions, zeta potential, sedimentation of suspensions, rheology, preparation, particle size and distribution), Emulsions (Classification, emulsifying agents, HLB value, Preparation, emulsion formation theories, etc.), Semisolid preparations (skin structure and properties, factors affecting dermal absorption, bases, penetration enhancers, types and acting mechanisms. Semi solid bases, Preparation methods of semisolids, required controls in semisolids). Suppositories and ovules (Suppository bases, Production technology of and drug release). Cosmetics and applications (Cosmetic products, Regulations in Turkey and world, Cosmeceuticals, Principles of formulation design in cosmetics, quality controls, final product specifications and quality controls).
**ECZ391) PHARMACEUTICAL TECHNOLOGY PRACTICE- I (P)**

*Hour/Week: 4, ECTS: 3*

Prescription balance, drop weight (drop count and dropping techniques), electrical top balance, controls on distilled and deionized water, effects of solid particle sizes, movement of solvent and physicochemical state on dissolution, Alcoholic camphor solution, alibour solution, aluminum subacetate solution and determination of Baume degree in liquids, lime water, Ethanol-Iodine solution (TF 1974), Lugol’s solution, Iodine glycerin solution, Glycerin-Phenol solution, determination of free iodine quantity, Diluted hydrogen peroxide solution, simple syrup, mint water, resorcin-saliclyc acid solution, determination of active chloride quantity, neutral sodium hypochlorite solution, magnesium citrate lemonade, Glass container controls, rubber cap controls, hydrophilic cotton controls, hydrophilic gauze controls, Practical applications

**ECZ392) PHARMACEUTICAL TECHNOLOGY PRACTICE- II (P)**

*Hour/Week: 4, ECTS: 3*


**ECZ393) PHARMACOLOGY I (T)**

*Hour/Week: 4, ECTS: 5*

General Principles: Pharmacokinetics; The dynamics of drug absorption, distribution and elimination Pharmacodynamics; Mechanisms of drug action, Relationship between drug concentration and effect, Receptors, Relationship between drug and receptor Drug-Drug Interactions; Pharmacodynamic drug-drug interactions, Pharmacokinetic drug-drug interactions Toxic Effects Of Drugs; “Mechanism-based” adverse drug reactions, “Idiosyncrcatic” adverse drug reactions, Teratogenicity, Hypersensitivity reactions Drugs Affecting Autonomic Nervous System; Neurotransmission: The autonomic nervous system and somatic motor nervous system, Muscarinic receptor agonist and antagonists, Anticholinesterase agents, Agents acting at the neuromuscular junction and autonomic ganglia, Catecholamines, Sympathomimetic drugs and adrenergic receptor antagonists Drugs Acting On The Central Nervous System; Medications for the treatment of Parkinson Disease, Medications for the treatment of epilepsies (Antiseizure drugs), Medications for the treatment of anxiety, hypnotics and sedatives, Stimulants of central nervous system, Anesthetics, Antidepressants, Antipsychotic agents, Opioid analgesic and antagonists, Drugs of abuse Drugs Affecting Cardiovascular System; Medications for the treatment of the congestive heart
failure, Antiarrhythmic drugs, Medications for the treatment of the angina pectoris, Antihypertensive agents, Drug therapy for hypercholesterolemia and dyslipidemia, Anticoagulant and thrombolytic agents, Hematopoietic agents, Drugs effective in iron deficiency and other hypochromic anemias.

(ECZ394) PHARMACOLOGY II (T)

Hour/Week: 3, ECTS: 3

Drugs Affecting Endocrine System; Pituitary and hypothalamus hormones, Thyroid and antithyroid drugs, Insulin, Oral hypoglycemic drugs, Adrenocortical steroids, Adrenocortical antagonists and adrenocorticotropic hormone, Androgens, Anabolic steroids and antiandrogens, Estrogens, Progestins and antiprogestins, Hormonal contraceptives Chemotherapy Of Microbial And Neoplastic Diseases; General considerations of therapy of microbial diseases, Antifolate drugs, Beta-lactam and other cell-wall and membrane active antibiotics, Protein synthesis inhibitors, Quinolones and agents for urinary tract infections, Antimyobacterial drugs, Antifungal agents, Antimicrobial agents Autacoids; Products of cyclooxygenase, Products of lipoxygenase, Histamine and antihistaminic drugs, Serotonin receptor agonists and antagonists, Medications for the treatment of migraine, Renin-angiotensin system, Angiotensin receptor antagonists and angiotensin converting enzyme inhibitors, Bradykinin and kallidin and their antagonists, Endotelin and nitric oxide Drugs Affecting Gastrointestinal Function; Agents used for treatment of peptic ulcers, Laxatives, Drugs stimulating gastrointestinal motility and antiemetic agents, Antidiarrheal agents, Pancreatic enzyme supplements, Bile acid therapy for gallstones.

(ECZ395) CLINICAL BIOCHEMISTRY (T)

Hour/Week: 1, ECTS: 2

Units in Clinical Biochemistry, Material collection, Parameters effecting test results, Drug interferences, Disorders of Carbohydrate Metabolism; Diabetes Mellitus, Disorders of Endocrine Functions; Thyroid function tests, Liver function tests and assessment, Lipids and dislipidemias, Renal function tests and assessment, Water and electrolytes, Acid base balance, Ca and Phosphor, Tests for Cardiovascular diseases, Blood analysis, Case discussions.

(ECZ396) PHYSIOPATHOLOGY (T)

Hour/Week: 2, ECTS: 2

Pathophysiology of diseases: Hypertension, heart failure-shock, arrhythmia, atherosclerotic heart disease, peptic ulcer, inflamed bowel diseases, liver diseases, constipation and diarrhea, gout, inflammation and Immunity, acute and chronic renal failure, Lymphoma, leukemia, rheumatoid arthritis, osteoporosis, thyroid gland diseases, diabetes mellitus, chronic obstructive pulmonary disease, tuberculosis. Definition and mechanisms of inflammation, hypoxia, ischemia, cyanosis. Regulation of body temperature and pathophysiology of fever. Definition, mechanism and types of pain. Vascular fluid regulation, pathophysiology of

(ECZ481) PHARMACOGNOSY III (T)
Hour/Week: 2, ECTS: 3
Definition of alkaloids distribution in plant kingdom will be described. Classification, botanical source, pharmacological activity and uses of alkaloids will be given. Further information will be mentioned about isolation, identification and analysis of these active alkaloidal substances. Information on enzymes, proteins, vaccines and serums also will be given.

(ECZ483) PHARMACOGNOSY III PRACTICE (P)
Hour/Week: 4, ECTS: 3
Microscopic characters, identification, isolation, pharmacopeial analysis, qualitative and quantitative analysis of the drugs containing alkaloid substances will be given experimentally.

(ECZ485) PHARMACEUTICAL CHEMISTRY III (T)
Hour/Week: 2, ECTS: 2
The mission of the Pharmaceutical Chemistry III course is to introduce students to the chemical formula, general physico-chemical and structural properties, synthesis, chemistry of metabolites structure-activity relationships of pharmaceutical agent. Topics include Cholinergic drugs: 1. Parasympathomimetics, 2. Anti-cholinesterase drugs, Neuromuscular blocking drugs, ganglion blocking drugs, sympatholytics, cardiovascular system drugs: anti-anginal drugs, anti-arrhythmics, anti-hyperlipidemics, anti-coagulants, trombolytics and anti-platelets.
**ECZ482** PHARMACEUTICAL CHEMISTRY IV (T)

*Hour/Week: 2, ECTS: 3*

The mission of the Pharmaceutical Chemistry IV course is to introduce students to the chemical formula, general physico-chemical and structural properties, synthesis, chemistry of metabolites structure-activity relationships of pharmaceutical agent. Topics include gastrointestinal system drugs, intestinal drugs, emetics and anti-emetics, diagnostic drugs, respiratory system drugs, oral antidiabetics, antihypoglycaemics, hormones, steroid hormones, ovarian- sex hormones, androgen- sex hormones, thyroid hormones and anti-thyroid compounds.

**ECZ487** PHARMACEUTICAL CHEMISTRY III PRACTICAL (P)

*Hour/Week: 4, ECTS: 3*

The aim of Pharmaceutical Chemistry III Practical course is to give a general knowledge about analysis of functional groups of organic substance and biologically important compounds using instrumental analysis methods. Topics include 1. Analysis of functional groups of organic substance, 2. Instrumental analysis methods, a. Ultraviolet and visible spectroscopy, b. Infrared spectroscopy and interpretation techniques, c. Nuclear magnetic resonance spectroscopy and interpretation techniques, d. Mass Spectroscopy and interpretation techniques, 3. Instrumental analysis methods and spectrum interpretation techniques.

**ECZ484** PHARMACEUTICAL CHEMISTRY IV PRACTICAL (P)

*Hour/Week: 4, ECTS: 2*


**ECZ489** PHARMACEUTICAL TECHNOLOGY III (T)

*Hour/Week: 3, ECTS: 3*

Powder technology, solid dosage forms and their technology (mixing of powders, mixed powders and packages, granules and effervescent granules, pilules and sachets. Hard and soft gelatin capsules and micropellets, microspheres. Tablet technology, tablet pressing physics, encapsulation

**ECZ486** PHARMACEUTICAL TECHNOLOGY IV (T)

*Hour/Week: 4, ECTS: 4*

Parenteral solutions (osmoses, diffusion and dialyze, isotonic and isohidri, parenteral production technology, filtration and ultra filtration, sterilization), eye, nose and ear drops,
stability of drugs and reaction kinetics, incompatibility, biopharmaceutics and pharmacokinetics, radiopharmaceuticals.

**(ECZ491) PHARMACEUTICAL TECHNOLOGY PRACTICE III (P)**

*Hour/Week: 4, ECTS: 2*

Carbomedicinalis package, eutectic mixtures, granules and effervescent granules, investigations of particle size distribution and flow properties of granules, capsule production, physical controls in capsules, tablets and their controls, gelatin lozonage, aerosol production and controls, prescription practices subjects are investigated.

**(ECZ488) PHARMACEUTICAL TECHNOLOGY PRACTICE IV (P)**

*Hour/Week: 4, ECTS: 4*

Parenteral solutions, drops (eye, nose and ear drops), sterile neutral olive oil, stability test for aspirin, incompatible prescriptions, in vitro dissolution test for solid dosage forms, industrial production for syrups, emulsions and ointments and prescription practices are investigated.

**(ECZ493) PHARMACEUTICAL TOXICOLOGY THEORY I (T)**

*Hour/Week: 2, ECTS: 3*

General information about toxicology and poisons; Entrance ways and absorption of poisons; Metabolism of toxic substances; Toxicokinetics; Mechanisms of toxic effects; Genetic toxicity; Chemical mutagenesis; Chemical carcinogenesis Teratogenesis; Systemic toxicology; Investigation of toxicity and risk analyses; First aid in acute poisonings and principles of antidote treatment.

**(ECZ490) PHARMACEUTICAL TOXICOLOGY THEORY II (T)**

*Hour/Week: 2, ECTS: 3*

Drug toxicity; Drug interactions; Drug abuse and dependence; Pesticides; Airborne poisons; Organic solvents; Metallic poisons; Radiation and radioisotopes; Natural poisons; Poisons of plant and animal origin.

**(ECZ495) PHARMACEUTICAL TOXICOLOGY PRACTICE I (P)**

*Hour/Week: 2, ECTS: 2*

Aim and general information; Phase I (EROD and cotinine) tests; Isolation and current use of genomic DNA molecule from biological samples; Genotyping 1 (gene deletion, GSTM 1, GSTT1), Genotyping 2 (SNP, GSTP1); Genotyping 3 (cut product); Genotoxicity tests used to identify chromosomal damage [Sister Chromatid Exchange (SCE) and micronucleus test (MN)]; Indication of potential antioxidant substances (DPPH, glutathione); Lipid peroxidation; Cytotoxicity; Investigation of acute toxicity; Evaluation of teratogenic effects of chemical substances using inseminated chicken embryo.
**ECZ492** PHARMACEUTICAL TOXICOLOGY PRACTICE II (P)

*Hour/Week: 4, ECTS: 2*

General information; Isolation and indication of ethyl alcohol from blood; Investigation of cyanide and carbon monoxide in blood; Liquid-liquid chromatographic isolation and defining tests of barbiturates; Identification of lead by dithisone extraction method; Indication of ALA from urine to evaluate the lead exposure; Toxicological analyses in food samples; Toxicological analyses performed in water, milk, dairy-products, and edible oil samples; Chromatographic separation and quantification methods used in toxicological analyses: Gas chromatography, thin layer chromatography; Narcotics and identification using thin layer chromatography.

**ECZ500** MEDICAL FIRST AID (T)

*Hour/Week: 1, ECTS: 1*

General principles of first aid, triage and transporting, cardio-pulmonary resuscitation, airway obstruction, artificial respiration methods, shock, coma, bleeding, soft tissue injury, dressing and bandages, fractures, dislocations, sprains, burns, heat injuries, cold injuries bites and stings, foreign bodies injuries, acute abdomen

**ECZ497** PHARMACEUTICAL LEGISLATION AND MANAGEMENT (T)

*Hour/Week: 2, ECTS: 3*

Laws, by-laws and regulations about pharmacy in Turkey and applications of fundamental subjects of management in pharmaceutical administrations are taught to students in this lesson. Especially 6197, 6643, 984, 2313, 992, 767 numbered laws and their regulations are explained in this lesson and planning, production, finance, controlling and personnel management in pharmaceutical administration are particular subjects in this lesson.

**ECZ498** FAMILY PLANNING (T)

*Hour/Week: 1, ECTS: 1*

The Definition of reproductive healthy Family Planning, General Principles, Aim of the Family Planning and Benefit of Family Planning, Population and Associated Factors The Population Politics in the World, Fertility and Associated Factors, Legal Status of Family Planning, the Anatomy and Physiology of Reproductive System, Counseling in Family Planning, Hormonal Contraceptives, Barrier Contraceptives, Intra Uterine Device, Sterilization, Traditional Contraceptives Methods, Other Contraceptives

**ECZ494** PHARMACOTHERAPEUTICS (T)

*Hour/Week: 2, ECTS: 3*

General principles: Drug Development, Pharmacogenetics, Drug—drug Interactions, Adverse Drug Reactions, Drug Allergies and Drug-Induced Diseases, New Methods in
Pharmacological Therapy, Pharmacoeconomics, Pediatric and Geriatric Pharmacology; Drug Treatment of the Cardiovascular System: Ischemic Heart Disease: Angina pectoris and Myocardial infarction, Congestive Heart Failure, Hypertension, Hyperlipidemia; Drug Treatment of the Respiratory System: Bronchial asthma, Acute and Chronic Bronchitis; Drug Treatment of the Endocrine System: Diabetes mellitus, Thyroid Disorders; drug treatment of the gastrointestinal system: peptic ulcer.

(ECZ499) PHARMACOLOGY III (T)

Hour/Week: 2, ECTS: 3

Drug Therapy Of Inflammation; Nonsteroidal anti-inflammatory drugs Drugs Affecting Respiratory System; Drugs used in asthma, Medications for the treatment of chronic obstructive pulmonary disease, Drugs used in rhinitis, Drugs used in the treatment of cough Drugs Affecting Renal Function; Diuretics Oxytocic Agents; Oxytocin, Ergot alkaloids Vitamins; Fat-soluble vitamins, Water-soluble vitamins.

(ECZ496) PHARMACEUTICAL CARE (T)

Hour/Week: 2, ECTS: 3

* IST GROUP ELECTIVE COURSES (ECZ-601-606)*

**ECZ601 BEHAVIOURAL SCIENCES (T)**

*Hour/Week: 2, ECTS: 2*

Behavioral sciences encompass all the disciplines that explore the activities of and interactions among individuals in the natural world. This lecture describes different disciplines that observe behavior. It involves the evolution of behavior, behavioral learning approach, cognitive learning approach and factors affecting learning. Students are provided with a basic knowledge in language and communication, motivation, emotions and emotional behavior as well. Pharmacy students also get advanced knowledge in drugs that alter behavior with a different perspective such as stimulants, sedative-hypnotics, hallucinogen drugs, etc.

**ECZ602 DEVELOPMENTAL PSYCHOLOGY (T)**

*Hour/Week: 2, ECTS: 2*

This lecture starts with a description of development, and its, maturation and learning, and lifelong development. It also provides a general knowledge about puberty, prepuberty and physical developmental at the beginning and end of puberty. Erikson’s Psychosocial Development Theory, and the theories of Piaget and Kohlberg and several factors that affect individual’s development (such as family, friends and physical development) will be covered.

**ECZ603 PRINCIPLES OF LAW (T)**

*Hour/Week: 2, ECTS: 2*

This course deals with the regulations of a society and the interaction of law with the social structure and individual rights. A general introduction to the scientific examination of law in terms of branching and specialization is provided. Constitutional law and the conflicts between law and constitution are within the scoop of this course. The students also learn the sources powered by law and how to reach the written resources of law

**ECZ604 INTRODUCTION TO SOCIOLOGY (T)**

*Hour/Week: 2, ECTS: 2*


**ECZ605 PUBLIC RELATIONS (T)**

*Hour/Week: 2, ECTS: 2*
The beginning and development of public relations and communication, the factors of basic communication such as aim, message, communication channel, feedback, and communication period are covered in this lecture. Also, the differences between advertisement and public relations are discussed. Other titles in this lecture include: description of administrative structure to public, understanding of public expectations and needs, tools in public relations, public relations in crisis management.

**ECZ606 GENERAL ACCOUNTING (T)**

*Hour/Week: 2, ECTS: 2*

This course aims to provide a general knowledge in accounting. It starts with an introduction to and description of accounting: history, mandatory books, optional books, legal rules to bookkeeping. Other major titles include: Financial statement and its qualifications, classification of balances, theories in financial statement; Balance in accounting: how to open or close an account; End of the year statement; Inventory and record keeping.

**IIIND GROUP ELECTIVE COURSES (ECZ 701-733)**

**(ECZ701) INSTRUMENTAL ANALYSIS (T)**

*Hour/Week: 2, ECTS: 2*

The aim of this course is to give the students a theoretical and practical knowledge in the use of instruments for analysis. The content of this course; technical information, glassware, chemicals, Optical methods: spectrophotometry, spectrofluorimetry, atomic absorption spectrometry, atomic emission spectrometry, refractometry, polarimetry, Chromatographic methods: thin layer chromatography (TLC), high performance liquid chromatography (HPLC), gas chromatography (GC), Electroanalytical methods: potentiometry, voltammetry, polarography, conductometry, amperometry Other spectroscopic methods: nuclear magnetic resonance spectroscopy (NMR), electron spin resonance Spectroscopy (ESR), mass spectroscopy (MS), Thermal analysis: thermal gravimetry (TG), differantial thermal analysis (DTA), differantial scanning calorimetry (DSC) and, capillary electrophoresis (CE), ion selective electrodes and flow injection analysis (FIA).

**(ECZ702) COMPUTER USAGE AND CALCULATION IN ANALYTICAL CHEMISTRY (T)**

*Hour/Week: 1, ECTS: 1*

The aim of this course is to teach the calculations used in analytical chemistry by supporting the computer. The content of this course; Analytical model designs depending on parameters such as temperature, pressure, pH, wavelength, absorbance, fluorescence and chromatographic separation capacity in analytical methods, regression analysis, algorithm preparation and its utilization for calibration, calculation of selectivity and sensitivity in calibration, transformation methods for signals used in analysis. The usage of computer programmes and calculations in application of analytical methods, basic mathematical
calculations, purity (or impurity) calculations in analysis, analytical laboratory equipments and their calibrations.

(ECZ703) PLANT NARCOTICS AND PSYCHOTROPS (T)

Hour/Week: 1, ECTS: 1

Definition of narcotic and psychotropic substances of plant origin will be described. Classification, source, use and active plant-originated substances with narcotics and psychotropic properties will be given. Further information will be mentioned about identification and analysis of these active substances. In the society, addiction problems of narcotic and psychotropic substances will also be discussed.

(ECZ704) HERBAL DRUG RAW MATERIALS (T)

Hour/Week: 1, ECTS: 1

Introduction, Features of medicinal plants, Use of medicinal plants, Obtaining of raw material from medicinal plants, Drug raw materials, source plants and effects (ephedrine, colchicines, taxol, vincristine, quinine, digitoxine, atropine, scopolamine, pilocarpine, reserpine, ergotamine, essin, gingko glycosides, ruscogenine, sennozit A and B, passiflora extract, hesperidins, physostigmine, galantamine, huperzine, alpha lipoic acid, pectin, lycopene, glucosamine, resveratrol, etoposide etc.). Introduction, the aim of the primary screening, the aim of the secondary screening, antibacterial activity tests in plant extracts, antifungal activity tests in plant extracts, anti-inflammatory activity tests in plant extracts, analgesic activity tests in plant extracts, hepatoprotective activity tests in plant extracts, spasmodic activity tests in plant extracts, antitumoral activity tests in plant extracts acute toxicity test in plant extracts.

(ECZ705) HERBAL TEAS (T)

Hour/Week: 1, ECTS: 1

The concept and definition about herbal teas, preparation techniques, classification based on indication (respiratory system disorders, digestive system disorders etc.) of mixed herbal teas have been described. Also biological activities, toxic effects and interactions of the plants in each group will also be discussed.

(ECZ706) NATURAL PRODUCTS FROM MARINE SOURCES (T)

Hour/Week: 1, ECTS: 1

Classification of marine organisms, chemical structure and biological activities of the compounds from these organisms, mechanisms of activity and potential applications are explained.

(ECZ707) BIOLOGICAL EFFECTS OF THE NATURAL PRODUCTS (T)

Hour/Week: 2, ECTS: 2
Introduction, the aim of the primary screening, the aim of the secondary screening antibacterial activity tests in plant extracts, antifungal activity tests in plant extracts, anti-inflammatory activity tests in plant extracts, analgesic activity tests in plant extracts hepatoprotective activity tests in plant extracts, spasmolytic activity tests in plant extracts antitumoral activity tests in plant extracts, acute toxicity test in plant extracts.

**(ECZ708) AROMATHERAPY (T)**

*Hour/Week: 1, ECTS: 1*

The concept and the definitions about the subject, aromatherapy application ways and fields, the essential and carrier oils used in aromatherapy and aromatherapy formulations have been described.

**(ECZ709) VITAMIN AND MINERALS AND RICHED NATURAL PRODUCTS (T)**

*Hour/Week: 1, ECTS: 1*

General concepts, activity, toxic effects, classification, of vitamins and minerals, multivitamin preparations and vitamin and mineral riched natural products will be discussed.

**(ECZ710) POISONOUS PLANTS of TURKEY (T)**

*Hour/Week: 1, ECTS: 1*

What is poison?, What is intoxication?, The Importance of Poisonous Plants in Turkish Flora, Toxic Compounds in Poisonous Plants, Classification of Plants According to Their Toxic Content, Relation Between Poisonous and Medicinal Plants, Poisonous Plants of Turkey, Plant Poisoning in Turkey, Important Notes in Poisoning.

**(ECZ711) PHYTOCOSMETICS (T)**

*Hour/Week: 1, ECTS: 1*

Today, the usage of plants in cosmetics increases conspicuously. Global tendency to the natural products also strengthens this deal. Plants with cosmetic importance and the uses of these plants are the main scopes of this course. Information about EU criteria for phytocosmetics is also included.

**(ECZ712) MORPHOLOGICAL and ANATOMICAL CHARACTERISTICS of HERBAL DRUGS (T)**

*Hour/Week: 1, ECTS: 1*

Identification of morphological and anatomical characteristics of medicinal plants is very important for the determination of purity and quality of herbal drugs. Morphological and anatomical characteristics of herbal drugs listed in “European Pharmacopoeia” and “ESCOP (The European Scientific Cooperative on Phytotherapy) Monographs” and also the medicinal plants used in Turkish Folk Medicine are within the scope of this course. The essentials of
herbal drug preparation and preservation are also mentioned. The main titles are: Leaf, Cortex, Underground Plant Parts, Aerial Plant Parts (Herba), Flower, Fruit, Seed, Others.

(ECZ713) ANTISEPTIC, DESINFECTANT AND THE DRUGS USED FOR THE VARIABLE INFECTIONS (T)

Hour/Week: 2, ECTS: 2

The mission of the Antiseptics, Disinfectants and the drugs used for the variable infections course is to introduce students to the chemical formula, general physico-chemical and structural properties, Synthesis and chemistry of pharmaceutical agents. Topics include I. Antiseptic and Disinfectant drugs II. Anthelmintic drugs III. Antiprotozoer drugs 1. Antimalarial drugs 2. Antiamibic drugs 3. Drugs used for Leishmaniasis 4. Antitrichomonal drugs 5. Drugs used for Trypanosome IV. Drugs used for ectoparasites.

(ECZ714) DRUG DESIGN AND THE METHODS (T)

Hour/Week: 1, ECTS: 1

The Importance of Rational Drug Design Methods, Effector-Target Relationships, Physicochemical Parameters, Quantitative Structure-Activity Relationship Analysis, Hansch Analysis, Free-Wilson Analysis, Mixed Analysis, 3-Dimensional Quantitative-Structure Activity Relationship Analysis, CoMFA and CoMSIA Analysis, Molecular Modeling Techniques, DeNovo Analysis

(ECZ715) GENOMICS AND CHEMIOINFORMATICS IN MEDICINAL CHEMISTRY (T)

Hour/Week: 1, ECTS: 1

This course introduces an overview of chemistry and classification of bioactive materials, macromolecular targets in medicinal chemistry, genomic studies in drug design, genomics, proteomics, chemoinformatic, pharmacogenomics, and applications of genomics in drug design, bioorganic chemistry, and synthesis of peptides, oligonucleotides, nucleosides, nucleic acids and enzymatic reagents.

(ECZ716) ISOMERS AND DRUG ACTIVITY (T)

Hour/Week: 1, ECTS: 1

Stereoisomerism and physicochemical and structural properties of stereoisomers. Stereoisomerism of drug active material and the behavior of stereoisomers in biological conditions and their activity differences. The discussion of pharmacological, toxicological, pharmacokinetic and pharmacoeconomic results of different biological answers based on these differences.

(ECZ717) CHEMICAL ANALYSIS AND EVALUATION ON BIOAVAILABILITY (T)

Hour/Week: 1, ECTS: 1
This course introduces an overview of general description of bioavailability, importance of bioavailability in treatment, examples and comparison of bioavailability of drugs, basics of bioavailability and bioequivalence, oral bioavailability of drugs, physicochemical parameters, analysis of body fluids, evaluation of bioanalytical methods and validation.

(ECZ718) COSMETICS AND THEIR APPLICATION AREAS (T)

**Hour/Week:** 2, **ECTS:** 2

Introduction, definitions, legal arrangements in Turkey for cosmetic products, FDA, COLIPA and Japanese regulations. Classification of cosmetic products, skin and the structure and characteristics of skin parts, importance from the cosmetic point of view. Cosmeceuticals, their classification, their usage purpose. General raw materials used in cosmetic formulations. Cosmetic products applied to the skin, formulation designs and their production. Cosmetic products applied to the skin parts, formulation designs and their production (cosmetic products which applied to hair, nails and mucous membranes). Controls on the prepared cosmetic products, determination of the final product specifications. Stability tests which are applied to the cosmetic products (physical, chemical and microbiological stability investigations). Side effects of cosmetic products.

(ECZ720) DESIGN AND DEVELOPMENT OF DRUG FORMULATIONS IN INDUSTRIAL PHARMACY (T)

**Hour/Week:** 2, **ECTS:** 2


(ECZ724) PROCEDURE ENGINEERING IN PHARMACEUTICAL TECHNOLOGY (T)

**Hour/Week:** 1, **ECTS:** 1

Basic subjects (gas and liquid flow, heat transfer, mass transfer, powders), unit operation (air filtration, humidity and heat, drying operation, solid-liquid extraction, evaporation and distillation, filtration, grinding operation, mixing operation, sterilization).
**ECZ727** PROCESS VALIDATIONS IN PHARMACEUTICAL TECHNOLOGY (T)

*Hour/Week: 1, ECTS: 1*


**ECZ728** FORMULATION DESIGN AND QUALITY CONTROL PROCESS OF HERBAL MEDICINAL DRUGS (T)

*Hour/Week: 1, ECTS: 1*

Preparation methods of herbal medicinal drugs (as liquid dosage forms, capsules, tablets, transdermal formulations, particular dosage forms, compress and bolus), Biopharmaceutical characterization of herbal medicinal drugs, Standardization of herbal medicinal drugs, Bioavailability of herbal medicinal drugs, Stability of herbal medicinal drugs, Quality assurance of herbal medicinal drugs, Dosage forms of herbal medicinal drugs and GMP.

**ECZ729** BASIC PHARMACEUTICAL PROCESSES (T)

*Hour/Week: 1, ECTS: 1*

Selection of parameters to investigate, depending on the dosage form to be developed. Selection of parameters to investigate, depending on active agent. Selection of parameters to investigate, depending on polymer and excipients. Solubility and dissolution rate mechanism and determination in media and polymer. Determination of diffusion coefficient and its importance in bioavailability. Determination of partition coefficient and its importance in formulation. Particle size analysis and its importance in formulation.

**ECZ730** DRUG SAFETY AND RISK ASSESSMENT IN DRUG USE (T)

*Hour/Week: 2, ECTS: 2*

Introduction of drug safety; Role of risk assessment in risk management; Constituting risk information during clinical trials; Special issues that must be taken into consideration during risk assessment; Pre-clinic and clinic studies before approval stage of drug; Adverse drug reactions (ADRs) and pharmacovigilance; Importance of pharmacovigilance and ADR monitoring centers; Importance of adverse drug reactions (ADR) in terms of patient harm and deaths; Post-marketing monitoring and reports of ADR; Withdrawal of drugs from market due to toxic effects; Classification of adverse drug effects and type A adverse reactions; Type B adverse reactions; Idiosyncratic reactions and underlying factors; ADRs not dependent to dose; Hypersensitivity; Allergy; Allergic drug reactions, anaphylaxis and serious dermal reactions; Photoallergy; Hepatotoxicity and blood discrasies; Induction and inhibition; Safety
of vegetal drugs; Adverse effects due to genetic polymorphism in drug metabolizing enzymes; Polymorphism of Cytochrome P450 (CYP) and Phase II enzymes; Drug safety in future

(ECZ731) GENETIC FACTORS IN EFFICIENT DRUG USE (T)

Hour/Week: 1, ECTS: 1

Role of interindividual genetic differences in drug use; Mechanisms of interindividual genetic differences in drug use; The toxicity originated from interindividual genetic differences in drug use; Genetic polymorphisms related with Phase I enzymes; The role of Phase I enzyme polymorphisms in drug toxicity; Genetic polymorphisms related with Phase II enzymes; The role of Phase II enzyme polymorphisms in drug toxicity and resistance; Bioinformatics; Cytogenetic tests in analysis and assessment of toxicity of drugs and toxic chemical substances; The importance of toxicogenetics in exposure to chemical carcinogens and mutagens; Drug-gene interactions and immune system diseases; The genetic factors in use of antineoplastic drugs.

(ECZ732) PROFESSIONAL ENGLISH I (T)

Hour/Week: 2, ECTS: 2

The course topic is to develop professional English by studying on English manuscripts, literatures and phrases through question-answer exercises, translations and oral presentations.

(ECZ733) PROFESSIONAL ENGLISH II (T)

Hour/Week: 2, ECTS: 2

The course topic is to develop professional English by studying on English manuscripts, literatures and phrases through question-answer exercises, translations and oral presentations.

(ECZ506) GLP GOOD LABORATORY PRACTICES (T)

Hour/Week: 2, ECTS: 2

Job and responsibility distribution Ratios of reference and test materials to be analyzed Devices and materials, Reagents, Physical and chemical test systems, Biological test systems Determination of test and reference materials, Sampling and keeping test and reference materials Standard working methods, Planning of a study, Result report and content, Destruction of analytical wastes, Keeping conditions of analytical samples, Pharmaceutical analysis according to pharmacopoeia, ISO 9001 quality management system.

(ECZ 507) ANALYTICAL VALIDATION (T)

Hour/Week: 2, ECTS: 2

Definition, Calculation of linear equation and related parameters, Validation parameters, Accuracy and precision, Repeatability, Limit of detection, Limit of quantification, Linearity,
Working range, Ruggedness, Robustness, Errors (simple, systematic, nonsystematic, standard), Confidence limit, Non-linear equations and their calibrations, Standard addition and calculations, System suitability tests (HPLC, spectrophotometry and electroanalytical techniques).

(EEZ508) DRUG AND ACTIVE COMPONENT ANALYSIS IN BIOLOGICAL SYSTEMS (T)

Hour/Week: 2, ECTS: 2

Biological samples and acquiring, Sample preparing techniques, In-vitro drug analysis in biological fluids, Optimization of drug analysis in biological fluids, Drug analysis in real biological fluids, Optimization of drug analysis in real biological fluids, Acceptability parameters of drug analysis in biological samples, Introduction to electrochemistry, Electrochemical DNA biosensors, Investigation DNA-drug interaction with biosensors, Drug analysis in biological fluids with biosensors, Analysis with ion-selective electrodes, Analysis in biological fluids with modified electrodes, Interpretation of results.

(EEZ546) ANALYSIS TECHNIQUES OF ACTIVE COMPONENT AND DRUG (T)

(In Association with Pharmaceutical Chemistry Department)

Hour/Week: 2, ECTS: 2

Pretreatment in active component analysis, method selection in active component analysis (qualitative and quantitative), determination criteria of optimum conditions in analysis, calibration types that is used in active component analysis, non-aqueous titrations in active component analysis, analysis techniques and method development depends on complex formation in active component analysis, spectrophotometric, spectrofluorometric analysis and method development in active component analysis, use of chromatographic techniques in active component analysis and method development, capillary electrophoretic analysis and method development in active component analysis, electroanalytical techniques and method development in active component analysis, other techniques and method development in active component analysis (polarimetry, refractometry, thermal analysis etc.), application of these techniques to various formulations.

(EEZ 547) ANALYSIS TECHNIQUES OF ACTIVE COMPOUND AND DRUG (T)

(In Association with Pharmaceutical Chemistry Department)

Hour/Week: 2, ECTS: 1

Pka determination of novalgine by spectrophotometric methods, pka determination of aspirin by spectrophotometric methods, determination of binary mixtures of paracetamol and caffeine in pharmaceutical dosage forms by spectrophotometric methods, determination of binary mixtures of paracetamol and caffeine in pharmaceutical dosage forms by spectrophotometric methods, determination of aspirin in pharmaceutical dosage forms by HPLC, determination of
aspirin in biological samples by HPLC, quantitative determination of paracetamol by capillary electrophoresis, functional group analysis of sulphonamide by NMR (1H, 13C) spectroscopy, analysis of antipyrine by mass spectroscopy (ESI), quantitative analysis of aspirin by acid-base titration, functional group analysis of phenobarbital by FTIR spectroscopy, quantitative analysis of phenothiazine by FTIR spectroscopy, functional group analysis of sulphadimidine by UV spectroscopy, quantitative analysis of sodium barbital by UV spectroscopy.

(ECZ 549) NUTRITIONAL BIOCHEMISTRY (T)

Hour/Week: 2, ECTS: 2

Human nutrition and its importance, digestion and absorption of major nutrients, carbohydrates as nutrients lipids as nutrients, proteins as nutrients, vitamins and minerals as nutrients, energy needs of human body nutrition in physiologic and pathologic conditions, total parenteral and enteral nutrition.

(ECZ550) METABOLIC INTERACTIONS AND REGULATION (T)

Hour/Week: 2, ECTS: 2

Carbohydrate metabolism and regulation, carbohydrate metabolism and regulation, lipid metabolism and regulation, lipid metabolism and regulation, protein metabolism and regulation, protein metabolism and regulation, energy supply during starved and fed state, energy requirement and caloric homeostasis, mechanisms associated with the transformation between fed and starved states in liver, type 1 and type 2 diabetes, fuel requirement at aerobic and anaerobic exercises, alterations and requirements in pregnancy and lactation, metabolic changes in stress and injury, glutamine metabolism.

(ECZ551) FREE RADICALS AND ANTIOXIDANTS (T)

Hour/Week: 1, ECTS: 1

Introduction to free radicals, mechanism of free radical effect, endogenous source of free radicals, exogenous source of free radicals, free radical damage, oxidative stress and diseases, oxidative stress and diseases, oxidative stress and aging, antioxidative defence mechanism, antioxidant enzymes, enzymatic antioxidants, nonenzymatic antioxidants, antioxidants in nutrition, oxidative stress determination techniques

(ECZ509) GENERAL ETHICS – PHARMACY ETHICS AND PHARMACIST – PATIENT COMMUNICATION (T)

Hour/Week: 2, ECTS: 2

General Conceptions and Definitions, Phylosophy and Ethics, Moral and Ethics, Deontology and Ethics, Bioethics, Ethical Principles, The Place of Ethical Principles in the Pharmaceutical Ethical Principles, Respect for the Autonomy of Others, Benevolence: Doing Good, Preventing Harm
Basic Justice: Being Fair, Ethical Principles in Pharmacy, Ethical Problems in Pharmacy, Ethical Dilemma, Decision Making Process of Ethics, Communication Methods, Behaviour of Patients’ and Patients’ Relatives’, Organization of the Places where Pharmacists and Patients can meet in Independent Pharmacies and Hospital Pharmacies, Important Points in Pharmacist-Patient and Pharmacist-Patient’s Relatives Meetings, Medicinal Consultancy in Independent Pharmacies and Hospital Pharmacies, Feedback in Pharmacist-Patient Communication and Benefiting from this Feedback, Case Studies.

**ECZ510) RESEARCH METHODS IN HEALTH SCIENCES AND LITERATURE RESEARCH (T)**

(In Association with Pharmaceutical Chemistry Department)

**Hour/Week: 1, ECTS: 1**


**ECZ 511) PRODUCTION AND MARKETING MANAGEMENT AND ORGANIZATION IN PHARMACY ADMINISTRATIONS**

**Hour/Week: 2, ECTS: 2**

General Conceptions, Definitions, Administrating and Management Functions and their Applications on Pharmaceutical Administrations, Legislation about Pharmacies, Pharmaceutical Warehouses and Pharmaceutical Industry, Job Descriptions, Sections, Related Personnel in Pharmacies, Pharmaceutical Warehouses and Pharmaceutical Industry, Production Management Strategies in Pharmaceutical Industry, Relationships of Production Department with Other Departments, Production Types and Management in Pharmaceutical Industry, Production Costs and Management in Pharmaceutical Industry, Marketing in Pharmaceutical Industry, Market and Marketing Research, Strategic Marketing Studies and Competition, Relationships of Marketing Department with Other Departments in Pharmaceutical Industry, Selection and Education of Marketing Personnel in Pharmaceutical Industry, Organization of Independent and Hospital Pharmacies, Production Management in Independent Pharmacies and Hospital Pharmacies Drug Distribution Systems, Managerial and Organizational Relationships of Hospital Pharmacies with Other Units.

**ECZ514) PHYTOMEDICINES I (T)**

**Hour/Week: 2, ECTS: 2**

Basic concepts and terms of phytotherapy, phytomedicines used in the central nervous system disorders, phytomedicines used in the gastrointestinal and biliary system disorders,
phytomedicines used as laxative, purgative and antidiareic, phytomedicines used in the endocrine system disorders, phytomedicines used in the immune system disorders, phytomedicines used as antioxidant, phytomedicines used for the diet.

(ECZ515) PHYTOMEDICINES II (T)

*Hour/Week: 2, ECTS: 2*

Phytomedicines used for the skin disorders, phytomedicines used in the urinary system disorders, phytomedicines used as analgesic and antirheumatic, phytomedicines used in the respiratory system disorders, phytomedicines used in the reproductive system disorders, phytomedicines used for the eye disorders, phytomedicines used in the cardiovascular system disorders, phytomedicines used as aphrodisiac.

(ECZ516) NATURAL PRODUCTS USED IN ONCOLOGY (T)

*Hour/Week: 1, ECTS: 1*

The cancer diseases and the role of plants in cancer treatments, the effect mechanism of the compounds from natural sources in treatment, vincristine, vinblastine, vindesin, podophyllotoxin and derivatives, colchicine and maytansine, taxol and derivatives indicine-n-oxide, camptothecin, ellipticines, cucurbitacines, phyllantoside, 4-ipomeanol and other tumor inhibitors.

(ECZ517) NUTRACEUTICALS (T)

*Hour/Week: 1, ECTS: 1*

Nutraceuticals: Term and History, The classification of nutraceuticals, The economical importance of nutraceuticals, Nutraceuticals in isoprenoid structure, Nutraceuticals in phenolic structure, Nutraceuticals in protein/aminoacid structure, traceuticals in carbohydrate structure, Nutraceuticals in lipid and fatty acid structure, minerals, Probiotics and prebiotics, The protective effects of nutreteuticals against same diseases, authorization methods of natraceuticals.

(ECZ 518) CHROMATOGRAPHIC ANALYSIS AND STANDARDIZATION OF HERBAL PRODUCTS (T)

*Hour/Week: 2, ECTS: 2*

Meaning of standardization on herbal products, standardization methods and giving examples, methods used for standardization, quality and quality control on herbal products necessary analysis for legislation of herbal products, development and validation of method of analysis for herbal products, standardization analysis of phytoterapeutics, analis of sedative drugs, analysis of laxative, purgative and antidiareic drugs, analysis of cardiovascular system drugs, analysis of urinary system drugs.
(ECZ519) PLANT BIOTECHNOLOGY (T)

Hour/Week: 1, ECTS: 1

Concept and history, Plant cells and organs, General laboratory setting; equipment, chemicals, Techniques used in biotechnology, Preparation and sterilisation of seeds and tissues, Plant growth regulators and media preparation, Root cultures, Callus cultures, Shoot cultures, Suspension cultures, Biotransformation, Construction of bioreactors, Industrial Production of secondary products, Biotechnologic products having economic value.

(ECZ512) DRUG INTERACTIONS (T)

Hour/Week: 2, ECTS: 2


(ECZ513) OTC DRUGS (T)

Hour/Week: 2, ECTS: 2

Oral and dental hygiene products, Drugs for cough and cold, Antiallergic drugs, Contact lens products, Ophthalmic and otic drugs, Antacids, OTC H2 receptor blockers, Laxatives and antidiarrheic drugs, Nutritional products and vitamins, Analgesics and antipyretics, Contraceptives, Weight management products, Sleep aids, Drugs for allergic rhinitis, Drugs for the treatment of acne.

(ECZ520) ETHNOPHARMACY and ALTERNATIVE THERAPY METHODS (T)

Hour/Week: 2, ECTS: 2

Introduction to ethnobotany and ethnopharmacy, history of plant-human relationships, traditional usage of plants, conservation of ethnobotanical richness, ethnobotanical study techniques, ethnopharmaceutical studies in drug discovery, aromatherapy, phytotherapy, homeopathy, kampo medicine, ayurvedic medicine, hydrotherapy.

(ECZ521) BIOLOGICAL RICHNESS of TURKEY (T)

Hour/Week: 1, ECTS: 1

Flora of Turkey, comparison of richness of flora of Turkey with the floras of other countries, economic plants of Turkey, economic plants of Turkey, economic plants of Turkey, export plants of turkey, export plants of turkey, export plants of Turkey, some chemical and biological activity investigations on plants of Turkey, some chemical and biological activity investigations on plants of Turkey, products from plants of Turkey, products from plants of
Turkey, medicinal plant potential of Turkey and some recommendations related to its evaluation, medicinal plant potential of Turkey and some recommendations related to its evaluation.

(ECZ545) PHYTOCHEMICAL SCREENING METHODS (T)

Hour/Week: 1, ECTS: 1

What are the phytochemical screening methods?, what is the importance of active substance screening, methods in herbal products?, reaction types used in screening, properties sought in screening methods preparation of plant extracts, preparation of plant extracts, reagents used in phytochemical screening, alkaloid screening in plant materials, alkaloid screening in plant materials, saponoside and flavonoid screening in plant materials, volatile oil, anthraquinone and coumarin screening in plant materials, tannin and cardioactive heteroside screening in plant materials.

(ECZ526) DRUGS USED IN HOSPITAL (T)

Hour/Week: 1, ECTS: 1

Description of General Anesthesia and Introduction in General, anesthetic Drugs, Gases or vapors (inhalational anaesthetics), injections (intravenous anaesthetics), special Combination Anesthesia and the other applications, the organo diagnostics: radiopharmaceutics, x-ray contrast, compounds and the other diagnostic systems (MR, CT, scintigraphy, etc.), diagnostics of metabolism, synthesis of drugs with iodo and radionucleid drugs, diagnostics of function, the antibacterial drugs used in hospitals, the oncology drugs used in hospitals, ganglioplegic drugs, intravitreal drugs and the others.

(ecz527) COMPUTATIONAL APPLICATIONS IN MEDICINAL CHEMISTRY (T)

Hour/Week: 1, ECTS: 1

Introduction to computer in medicinal chemistry, receptor concept, chemical bonds in drug-receptor interactions, drug targets, conformational analysis, pharmacophore analysis, pharmacophore analysis, database searching, docking applications, denovo design, presentations of softwares used in molecular modelling, presentations of softwares used in molecular modelling.

(ECZ528) METABOLISM IN DRUG DESIGN TIMETABLE OF THE CLASSES (T)

Hour/Week: 1, ECTS: 1

Introduction to drug metabolism (biotransformation), reactions and pathways of metabolism, reactions and pathways of metabolism, drug design and development methods, importance of metabolites in pharmacological activity, metabolite effect on drug deactivation, metabolite effect on drug toxicity, metabolites that are responsible modifying pharmacological activity, drug design using metabolites and molecular modifications, drug design using metabolites
and molecular modifications, drug design using metabolites and molecular modifications, drug design using absorption and transport properties of metabolites.

(ECZ530) BIOTECHNOLOGY IN MEDICINAL (T)

Hour/Week: 1, ECTS: 1

Synthesis and introduction to biologically important peptide, oligonucleic chemistry, importance of biotechnology in synthesis, chemical structure of carbohydrates in drug formation, chemical properties of nucleic acid and importance of analogues of nucleosides in medication, biotechnological evaluation of enzyme and proteins, assessment of enzyme and proteins as receptors, biotechnological investigation of enzymatic reagents that assist reactions rate, recent biotechnological developments, classifications, synthesis and application of enzyme inhibitors, developments in the area of immune-organic chemistry, investigation of bioorganically catalyzed reactions, introduction of bioorganic receptors and interactions with drugs, classification and structural investigation of bioorganic pro-drugs and biopolymers, role of biotechnology in the development of synthesis of vitamins and hormones, biotechnological methods in drug development.

(ECZ531) DIVERSE DRUG CATEGORIES IN THERAPY (T)

Hour/Week: 1, ECTS: 1

Respiratory stimulants and convulsion stimulants, Physicomotor stimulants and adrenergic stimulants Physicomimetic compounds (indolealkylamines), phenylalkylamines, opium and cannabinoids, nootropics, 2-pyrolidone and pyridine derivatives, acridine and dimethylaminoethanol derivatives classification of antiparkinson drugs and dopaminergic compounds, precursors of dopamine and ergo alkaloids, dopamine antagonists, muscarinic compounds with antiparkinson activity, tertiary alcohol derivatives and benzhydrlie ethers, structure activity relationships of dopamine antagonists, antialzheimer compounds and their structure activity relationships.

(ECZ532) AGRICULTURAL AND VETERINARY DRUGS (T)

Hour/Week: 1, ECTS: 1

Introduction to agricultural and veterinary drugs and general definition, studies on risk factors of agricultural drugs and precaution that is needed to be taken, poisoning with agricultural combat drugs and their antidots, rules for licensing agricultural drugs and related regulations, classification of agricultural drugs (insecticides, acaricides, medicines for seasonal combat, fumigants, nematocides, rodenticides, molluscicides, fungicides, herbicides), classification of agricultural drugs (insecticides, acaricides, medicines for seasonal combat, fumigants, nematocides, rodenticides, molluscicides, fungicides, herbicides), classification of agricultural drugs (insecticides, acaricides, medicines for seasonal combat, fumigants, nematocides,
rodenticides, molluscicides, fungicides, herbicides), classification of agricultural drugs (insecticides, acaricides, medicines for seasonal combat, fumigants, nematocides, rodenticides, molluscicides, fungicides, herbicides), classification of agricultural drugs (insecticides, acaricides, medicines for seasonal combat, fumigants, nematocides, rodenticides, molluscicides, fungicides, herbicides), definition and classification of veterinary medicines (analgesics, analeptics, antihistaminic, chemotherapeutics, antiseptic and disinfectants, antiectoparasite medicines, anthelmintic medicines, vitamins and mineral compounds, hormones), definition and classification of veterinary medicines (analgesics, analeptics, antihistaminic, chemotherapeutics, antiseptic and disinfectants, antiectoparasite medicines, anthelmintic medicines, vitamins and mineral compounds, hormones), definition and classification of veterinary medicines (analgesics, analeptics, antihistaminic, chemotherapeutics, antiseptic and disinfectants, antiectoparasite medicines, anthelmintic medicines, vitamins and mineral compounds, hormones), definition and classification of veterinary medicines (analgesics, analeptics, antihistaminic, chemotherapeutics, antiseptic and disinfectants, antiectoparasite medicines, anthelmintic medicines, vitamins and mineral compounds, hormones).

(ECZ538) SYNTHESES of DRUG RAW MATERIALS and INGREDIENTS (T)

*Hour/Week: 1, ECTS: 1*

Introduction to industrial drug synthesis, physical basics of organic reaction mechanisms, designing of synthesis, chemical process, combinatorial techniques in drug synthesis, synthesis of antibiotics and antibacterials, synthesis of opiates, synthesis of steroids, synthesis of cardiovascular drugs synthesis of some natural originated drugs, synthesis of radiopharmaceutics, synthesis of, organometallic drugs, developments and encountered problems.

(ECZ546) ANALYSIS TECHNIQUES OF ACTIVE COMPONENT AND DRUG (T)
(In Association with Pharmaceutical Chemistry Department)

*Hour/Week: 2, ECTS: 2*

Pretreatment in active component analysis, method selection in active component analysis (qualitative and quantitative), determination criteria of optimum conditions in analysis, calibration types that is used in active component analysis, non-aqueous titrations in active component analysis, analysis techniques and method development depends on complex formation in active component analysis, spectrophotometric, spectrofluorometric analysis and method development in active component analysis, use of chromatographic techniques in active component analysis and method development, capillary electrophoretic analysis and method development in active component analysis, electroanalytical techniques and method development in active component analysis, other techniques and method development in active component analysis (polarimetry, refractometry, thermal analysis etc.), application of these techniques to various formulations.
(ECZ 547) ANALYSIS TECHNIQUES OF ACTIVE COMPOUND AND DRUG (T)

(In Association with Pharmaceutical Chemistry Department)

Hour/Week: 2, ECTS: 1

Pka determination of novalgine by spectrophotometric methods, pka determination of aspirin by spectrophotometric methods, determination of binary mixtures of paracetamol and caffeine in pharmaceutical dosage forms by spectrophotometric methods, determination of binary mixtures of paracetamol and caffeine in pharmaceutical dosage forms by spectrophotometric methods, determination of aspirin in pharmaceutical dosage forms by HPLC, determination of aspirin in biological samples by HPLC, quantitative determination of paracetamol by capillary electrophoresis, functional group analysis of sulphonamide by NMR (1H, 13C) spectroscopy, analysis of antipyrine by mass spectroscopy (ESI), quantitative analysis of aspirin by acid-base titration, functional group analysis of phenobarbital by FTIR spectroscopy, quantitative analysis of phenothiazine by FTIR spectroscopy, functional group analysis of sulphadimidine by UV spectroscopy, quantitative analysis of sodium barbital by UV spectroscopy.

(ECZ522) INFECTIOUS DISEASES AND EPIDEMIOLOGY OF HOSPITAL INFECTIONS (T)

Hour/Week: 2, ECTS: 2

Definitions about epidemiology and infectious diseases, transmission ways of infectious diseases and epidemiical types epidemiology and control of common bacterial, viral, parasitic and mycotic infections in our country(microorganisms that causes hospital infections and epidemiology of hospital infection, prevention, control of hospital infections and antibiotic usage, eradication, control of agents that resistant to several antibiotics and causes hospital infections and hospital hygiene

(ECZ523) MICROBIOLOGICAL ANALYSIS OF PHARMACEUTICAL PREPARATIONS (T)

Hour/Week: 2, ECTS: 2

Contamination sources on pharmaceutical products, classification of pharmaceutical preparations according to the fip suggestions and microbial standartization, methods of counting microorganisms, identification, isolation, transmission ways and properties of microorganisms that shouldn’t be in pharmaceutical preparations, microbiological limit tests of preparations that do or don’t have to be sterilized.

(ECZ524) INDUSTRIAL MICROBIOLOGY (T)
Hour/Week: 2, ECTS: 2

Industrial microbiology, utilized microorganisms and their manufacture, industrial fermentation, the utilized microorganisms, gene engineering in industrial microbiology, bacterial metabolism and its enzymes, manufacture of some products by fermentation and techniques used in industrial microbiology.

(ECZ525) DETERMINATION of DISSOLUTION RATE on THE EVALUATION of DRUG FORMULATION and QUALITY CONTROLS and ITS IMPORTANCE (T)

Hour/Week: 1, ECTS: 1

Dissolution rate, definition and mechanisms, officinal methods given in pharmacopoeial monographs non-official methods, importance of dissolution rate from the point of bioequivalence, importance of dissolution methods on the evaluation of formulations, dissolution methods from the point of finished product quality control, classical dosage forms, controlled release dosage forms, evaluation of dissolution rate data, alternative methods in bioavailability/bioequivalence determinations.

(ECZ533) DESIGN and APPLICATION on BIOAVAILABILITY/ BIOEQUIVALENCE (T)

Hour/Week: 1, ECTS: 1

Pharmacokinetics, design of bioavailability practice, statistical methods and average bioavailability, intra- and inter- subject variabilities, cross experimental designs between two formulations, bioequivalence, chemical equivalence, pharmaceutical-generic equivalence and therapeutical, equivalence, therapeutical alternative and pharmaceutical alternative.

(ECZ534) DRUG PREPARATION on HOSPITAL SCALE (T)

Hour/Week: 1, ECTS: 1

Preparation of Internally given drugs, preparation of externally applied drugs, preparation of parenterally applied drugs, serums, plasma expanders and large volume parenteral preparations (LVP), surgical and medicinal materials used in hospital practice and their controls

(ECZ535) SYSTEMS for CONTROLLED DRUG DELIVERY and DELIVERY MECHANISMS (T)

Hour/Week: 2, ECTS: 2

Terminology, investigations of active agent properties chosen for the controlled release, investigations on the physicochemical properties of active agent, investigations on the biopharmaceutical-pharmacokinetic properties of active agent, determination of dosage forms for controlled release, matrix type preparations, capsules, osmotic pumps, floating dosage forms, bioadhesive systems, microparticulate systems, dose design, other application areas, transdermal systems, parenteral systems, implant systems, ocular systems rectal and vaginal
systems, nasal and pulmonary systems, buccal systems, selection of the polymer type investigation of the release mechanisms, regulations on the controlled release systems, application areas on veterinary medicine, application areas on agricultural drugs.

(ECZ536) RADIOPHARMACEUTICALS (T)

Hour/Week: 1, ECTS: 1

Radiopharmacy and definition, radiopharmaceutic and definition, radionuclide and its applications on the medicine and pharmacy, radioactivity and radiation, radioactive decomposition, methods used for the measurement of radioactivity, formulation design in radiopharmaceutics, labeling in radiopharmaceutics sterilization of radiopharmaceutics, storage of radiopharmaceutics -quality assurance of radiopharmaceutics legal regulations in radiopharmacy.

(ECZ537) BASIC PROCESS on THE DESIGN of DRUG FORMULATIONS (T)

Hour/Week: 1, ECTS: 1

Basic designs in evaluation of drug formulations in industrial pharmacy, investigation of technological parameters aimed to compose pharmaceutical forms in, industrial pharmacy, development of drug manufacturing parameters in industrial pharmacy, investigation of the factors affecting the manufacturing in industrial pharmacy, evaluation of in-process and process controls of drug manufacturing in industrial pharmacy, national and international regulations about the parameters of drug manufacturing in industrial pharmacy, basic contents of stability tests applied in drugs, stability investigations in drug manufacturing, preformulation and formulation steps national and international conditions and regulations applied in stability tests of drugs, investigation on the expiry date of drugs, stability investigations of pharmaceutical dosage forms, stability applications on pharmacy practice, stability applications on hospital pharmacy and clinical pharmacy.

(ECZ539) BIOTECHNOLOGY ORIGINATED PHARMACEUTICAL PRODUCTS and FORMULATION DESIGNS (T)

Hour/Week: 2, ECTS: 2

Definitions and application areas of biotechnology and pharmaceutical biotechnology, biotechnologically origined pharmaceutical products, characteristics of biotechnologically origined pharmaceutical products, structure and structural characteristics, preformulation and formulation characteristics, technological manufacturing parameters, stability characteristics, dosage form designs of biotechnologically origined pharmaceutical products, delivery routes of biotechnologically origined pharmaceutical products oral, parenteral, rectal, vaginal, dermal, ocular and nasal delivery, quality controls on biotechnologically origined pharmaceutical products, finished product, specifications and international regulations

(EZ540) CERTIFICATION PROCEDURES on DRUGS, COSMETICS and INTERMEDIATE PRODUCTS (T)
Hour/Week: 1, ECTS: 1

Law and regulations directed to public in turkey, criteria for the certification of approval of innovator and generic drugs in turkey, fda and emea regulations in certification of approval definition of intermediate product, criteria of manufacturing and importation of these products manufacturing and importation procedures of cosmetic products.

(ECZ541) FORMULATION DESIGN and QUALITY CONTROL PRACTICE on COSMETIC PRODUCTS

Hour/Week: 2, ECTS: 2

Introduction, definitions, international and turkey regulations, related to the subject, classification of cosmetic preparations, cosmetic ↔ pharmaceutic ↔ cosmeceutic relation, cosmeceuticals, classification and purpose of use, selection criteria of appropriate cosmetic vehicle system formulation studies determination of finished product specifications on the prepared cosmetic products stability tests applied on the cosmetic preparations, investigation of physical stability, investigation of chemical stability, investigation of microbiological stability, examination on the microbiological stability results according to the regulations, evaluation of skin efficacy of cosmetic products by non-invasive techniques, adverse effects of cosmetic products.

(ECZ542) GOOD MANUFACTURING PRACTICE on PHARMACEUTICAL PRODUCTS – GMP (T)

Hour/Week: 1, ECTS: 1

International regulations, manufactured dosage forms, organisation and personnel, manufacturing places and equipments, controls on the raw material and package systems, manufacturing and process controls packaging and labeling, laboratory controls and recording systems, pharmaceutical checking systems and regulations.

(ECZ529) THE TOXICOLOGICAL IMPORTENCE OF DRUG USAGE DURING PREGNANCY, CHILDHOOD AND OLD AGE PERIODS (T)

Hour/Week: 1, ECTS: 1

The safety usage of drugs and basic concepts, drug kinetics during pregnancy, the analyses of possible harmful risk factors of using drugs during pregnancy, clinical findings of drug toxicities and measures taken during pregnancy, drug kinetics in newborns and children, toxicities related with drug use in newborns and children, treatment of drug toxicities during newborn and childhood, drug kinetics and drug toxicities during lactation the issues that must be taken into consideration about drug usage during lactation, drug kinetic in elderly, adverse reactions of drug use in elderly, evaluation of possible risk factors of drug use in elderly, the issues that must be taken into consideration about drug usage in elderly.

(ECZ543) COSMETIC TOXICOLOGY (T)
The structure of skin and toxicological significance of percutaneous absorption, biotransformation of skin and toxicological significance, the acute and chronic toxicities of cosmetics, allergic contact dermatitis and irritant contact dermatitis, phototoxic and photoallergic contact dermatitis, photochemical carcinogenesis, the risk assessment of chemical ingredients of cosmetics, the carcinogenic and mutagenic risks of xenobiotics of cosmetics, the contaminants and ingredients of cosmetics causing adverse effects, skin care and make-up products, shampoos, hair dyes and permanent wave products, antibacterial agents, antiperspirants and deodorants perfumes and sun screen products, the regulations of chemical ingredients of cosmetics.

(ECZ544) TOXIC SUBSTANCES IN FOOD (T)

General principals of food toxicology, the chemical pollution (contaminants) in food, mycotoxins (aflatoxins, patulin…), chemical pollutants (N-nitrozo compounds) formed by chemical reactions in food, carcinogens formed during cooking (PAHs, pyrolysis products, acrilamids…), food additives and aims of using, the regulations of food additives in world and Turkey, the safety values of food additives in human (NOAEL, ADI, MPI…), the international agencies working for safety of food additives (WHO, codex Alimentarius Commissions, JECFA, FAO, FDA…), european union directives and E-codes, hereditary disease groups related with food, the role of nutrient elements in detoxification mechanism, the genetically modified food, the relationship between food, environment and cancer.